

Dr. W. W. E. Fletcher's Report to the Local Government Board
on the Urban Districts of Longton and Fenton, in the
County of Staffordshire, in reference to long-sustained
and highly-fatal prevalence of Diphtheria therein.

RICHD. THORNE THORNE,
Medical Department,
January 28th, 1899.

Previously to the year 1896 diphtheria had not shown any marked incidence on the Urban Districts of Longton and Fenton, their annual death-rates per 1,000 inhabitants, from that disease, having been, for many years, well below the corresponding death-rates for England and Wales, and for the "67 towns" of the Registrar-General. I have deemed it better to draw comparison with these 67 large towns, rather than with the group of (33) largest towns of the Registrar-General, having regard to the populations and local circumstances of Longton and Fenton. During 1896, however, diphtheria prevailed to such an extent that the death-rate therefrom in that year in each of these two districts increased to, approximately, double that for England and Wales, and to more than double that for the 67 large towns. In the following year, 1897, the prevalence of the disease further increased, so that the Longton diphtheria death-rate for that year amounted to *eleven* times, and that for Fenton to *eight* times as much as the corresponding rates for England and Wales, and for the 67 large towns; while in the first quarter of 1898 the diphtheria mortality in Longton was equivalent to an annual death-rate *fourteen* times as great, and the corresponding mortality in Fenton to an annual death-rate *nine* times as great as that for England and Wales, and *ten* and *seven* times, respectively, that for the 67 large towns.* Under these circumstances I received instructions to make enquiry into the causes of this sustained and increasing prevalence of the disease, and I have to report as follows:—

Longton and Fenton are adjoining urban districts, and each forms one of the five sub-districts of the Stoke-on-Trent Registration District. The populations of the two districts comprise almost entirely people of the working-classes. The chief industries are pottery-making, coal-mining, iron-working, and brick-making.

LONGTON.

a. GENERAL SANITARY CONDITION.

The Borough of Longton, incorporated in 1865, comprises an area of 1,948 acres; and had, at the census of 1891, a population of 34,327 persons.

Geologically, the surface of the district is undulating, and overlies the Coal Measures, excepting in the south-eastern portion, in the neighbourhood of Normacot, where it rests on the Bunter Beds of the New Red Sandstone formation.

Water Supply.—The water-supply is constant, and is derived from the works of the North Staffordshire Water Company.†

* A table illustrating these facts, Table I., will be found on p. 5.

† The water distributed by this Company is "obtained . . . from four sources of supply, (a) Meir; (b) Hatton, obtained by pumping; (c) Normacot; and (d) Weston Coyney, by piping natural springs, all rising in an extremely pervious Bunter bed of New Red Sandstone; water apparently liable to contamination from sewage; water from Meir source only submitted to filtration." Dr. R. Deane Sweeting, p. 133, Supplement (Inland Sanitary Survey) to the Report of the Medical Officer of the Local Government Board, 1893-1895.

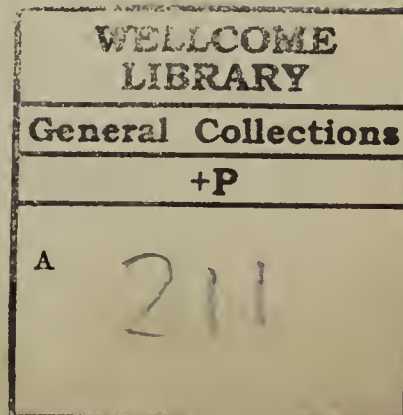
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Sewerage.—The sewers, which serve the whole district, are mainly constructed of socketed pipes jointed in cement. Ventilation of sewers is afforded by means of street gratings, and a few (30 or 40) ventilation pipes erected against buildings. Flushing of sewers is effected by means of tank-carts. The sewage is treated by broad irrigation on Blurton Waste Farm, of which some 216 acres can be irrigated. It is delivered directly on to the land, no screening or settling tanks being provided; from the various pen-stocks the sewage flows either hap-hazard, or in channels cut in the soil. Plans for improvements of the disposition of sewage on the farm are now under consideration.

House-drains.—House drains are disconnected from sewers, but frequently sink-pipes are disconnected from drains in an unsatisfactory manner which admits of soakage of sewage into the foundations of dwellings.

Closet Accommodation.—Water-closets of various forms and cesspit privies are in use. The former are generally outside the dwellings and consist of some form of hopper or wash-out closet, some provided with flushing cisterns, some hand-flushed, the latter being not infrequently neglected. Waste-water closets are also in use. The cesspits into which privies discharge are separate from ashpits. They are not built upon a satisfactory principle. It is said that they are generally lined with bricks set in cement. The erection of new cesspit-privies is forbidden.

Closet Accommodation at Elementary Schools.—Excepting Normacot Board School, all the elementary schools in Longton are provided with trough-closets. At Normacot Board School half the closets are trough-closets, and half are cesspit-privies which are about to be converted into trough-closets.

Removal of Nightsoil and House-refuse.—This work is performed by the Corporation's own servants, premises being visited at intervals of about six weeks. On the whole the work appears to be well attended to, though instances of over-full ashpits and of cesspits requiring immediate attention were observed. Ashes, dry refuse, and such nightsoil as cannot be at once disposed of to farmers, are removed to a dépôt where the ashes (excepting a portion otherwise used as described in the next sentence) and dry refuse are burnt, the clinkers ground up and mixed with lime for mortar, or with cement, and then set in moulds to form street flags. The nightsoil removed to the dépôt is not burnt, but is mixed with a reserved portion of the dry ashes and cinders in a puddling mill, and subsequently disposed of to farmers. At the dépôt there is a "destructor" which has been in use for twelve or more years. It comprises six furnaces, two of which are provided with steam blasts. There are also two cremating-cells.

House-accommodation.—There are some old houses in several parts of the district which cannot be looked on as healthy habitations; but in most instances the houses are fairly modern and in good condition. Backyards are, as a rule, well cared for, and are kept clean. Most of them are paved with Staffordshire blue bricks.

b. ADMINISTRATION.

The Medical Officer of Health is Mr. William Joseph Dawes, M.R.C.S., Eng., L.S.A. He receives a salary of £65 a year, no portion of which is repaid out of County funds. He devotes a portion only of his time to the duties of Medical Officer of Health, being engaged also in private practice.

The Inspector of Nuisances is Mr. William Cooke, who receives a salary of £120 per annum, no portion of which is repaid. He is assisted by his son, who receives a salary of £78 per annum.

Local Acts.—There are two Local Acts in force, viz.: The Longton Improvement Act, 1883, and the Longton Extension Act, 1884.

Voluntary Acts.—The following Acts have been adopted:—

The Infectious Disease (Notification) Act, 1889, adopted March 9th, 1891.

The Infectious Disease (Prevention) Act, 1890, adopted February 5th, 1891.

The Public Health Acts Amendment Act, 1890, Parts ii. and iii., adopted December 4th, 1890.

No action has been taken under the Housing of the Working Classes Act, 1890.



Bye-laws.—Bye-laws are in force with respect to the following matters :—

Nuisances—	allowed	August 6th, 1867.
New streets and buildings—	„	August 6th, 1867.
Market—	„	August 6th, 1867.
Common lodging-houses—	„	August 6th, 1867.
Slaughter-houses—	„	August 6th, 1867.
Hackney carriages—	„	August 6th, 1867.
Queen's Park—	„	May 26th, 1877.
Cemetery—	„	March 27th, 1893.

The whole group of the 1867 series of Bye-laws is now under revision.

Regulations as to dairies, cowsheds, and milk-shops have been drawn up, under the Dairies, Cowsheds, and Milk-shops Order of 1885, but the importance locally attached to them may be judged by the fact that they have not been printed for circulation.

Isolation Hospital.—The only means of isolation provided for this borough is that afforded by the old Cottage Hospital. Subsequently to its ceasing to be used for a cottage hospital it was reserved for the isolation of patients suffering from small-pox. For some years past it seems to have been allowed to fall into neglect and disrepair, but quite recently, in April last, some of the rooms were cleaned and furnished for the reception of patients suffering from diphtheria. The place is quite unsuitable for purposes of isolation. The door opens into a street, Mount Pleasant. Many of the rooms are quite unfit for habitation, and dust and dirt lie thickly on the floors of the unoccupied portion. There is no closet accommodation inside the building, and the single closet which is provided outside was found out of order and unfit for use. Six rooms have been furnished with ten beds. At the time of my visit five patients suffering from diphtheria were in residence, the other inmates being a caretaker, his wife, and a nurse. I was given to understand that two patients were allowed to occupy one bed. The hospital arrangements at present in use are absolutely discreditable, and their existence is the more extraordinary seeing that the Town Council have been for some years past in possession of an excellent hospital site close to the town, the purchase of which was sanctioned by the Board after an Inquiry held by two of the Board's Inspectors during the year 1893. The only plea offered for neglect to build a proper hospital is the fact that Longton has been in negotiation with other authorities with a view to the provision of a joint hospital.

Disinfecting Apparatus.—One of Dr. Ransom's hot-air disinfectors, erected by Goddard and Massey, was provided in a building near the cemetery some years ago. It is furnished with a door at each end, each door opening into a separate room, one for infected, and the other for disinfected articles. Under the same roof are two separate rooms which afford accommodation for two covered hand-carts, one for infected, and one for disinfected things. Mr. Cooke informed me that a temperature of 230° was that recognised as sufficient for disinfecting purposes, and that the disinfection of each lot of clothing, bedding, &c., occupied six hours.

FENTON.

(a) GENERAL SANITARY CONDITION.

The Urban District of Fenton comprises an area of 1,748 acres ; and had, at the census of 1891, a population of 16,998 persons.

Geologically, the district is situated on the Coal Measures. The surface is undulating.

Water Supply.—The district is served with a constant supply of water by the North Staffordshire Water Company.

Sewerage.—The sewers are pipe-sewers with socketed joints, made generally with clay, but some of the recent sewers have been furnished with patent cement joints. The pipes are twelve and fifteen inches in diameter. Several of Shone's ejectors are in use for raising sewage from low lying parts of the district. Ventilation of sewers is afforded by means of street gratings and a few ventilation shafts. Flushing of sewers is effected by means of tank-carts. The sewage ultimately gravitates to a farm known as Longton Hall Farm, some portion of

which is utilized for filtration and broad irrigation. Settling tanks and a filter bed are provided at the outfall of the main sewer. At the time of my visit the former were foul, and the latter was not, and had not been for some time, in use. The final effluent is admittedly unsatisfactory. About sixty acres can be irrigated.

House Drains.—House drains are disconnected from sewers, but not always in a satisfactory manner. House drains, jointed with clay, are, I was informed, allowed to be laid in connection with new houses; in fact, as I had opportunity of observing, buildings in course of erection do not receive proper supervision.

Closet Accommodation.—The majority of the closets are of the cesspit-privy type. Of these there are nearly 1,700. There are also some 866 waste-water closets of different patterns, but nearly all are Duckett's, only about 16 being Day's. Of ordinary water-closets, some provided with flushing cisterns and some hand-flushed, there are 422. Closet accommodation is almost invariably provided outside the houses. Conversion of cesspit-privies into water-closets is progressing rapidly; thus, during the past four years, 632 privies have been so altered.

Closet Accommodation at Elementary Schools.—All the elementary schools in Fenton are provided with Adams's trough-closets, or with "wash-out" closets with flushing cisterns.

Removal of Nightsoil and House Refuse.—Privy-cesspits and ashpits are kept distinct from one another, the latter being intended for dry house refuse only. Both are scavenged by men in the employ of the District Council, and the work, generally, seems to be efficiently performed. Dry ashes are utilized for filling up hollows in the land. Nightsoil is sent to farmers, and is, it is stated, insufficient in quantity to supply the demand for it.

House Accommodation.—In some of the more crowded parts of the district alterations have been effected, with a view to providing more light and air-space, by pulling down old houses, and further improvements of this kind are in view. Most of the houses, however, are modern, and building is rapidly progressing. On the whole, existing house accommodation is not unsatisfactory. The back yards are mostly paved with blue bricks, and are kept fairly clean.

(b) ADMINISTRATION.

The Medical Officer of Health is Mr. Alfred Vavasour Griffiths, M.R.C.S., Eng., L.S.A., Lond. He receives a salary of £60 a year, half of which is repaid out of County Funds. He is also engaged in private practice.

The Inspector of Nuisances is Mr. R. Thornton. He receives a salary of £115 a year, half of which is repaid out of County Funds, and devotes the whole of his time to the duties of his office.

Voluntary Acts.—The following Acts have been adopted :—

The Infectious Disease (Notification) Act, 1889, adopted February 24, 1891.

The Infectious Disease (Prevention) Act, 1890, adopted February, 1891.

The Public Health Acts, Amendment Act, 1890, Parts ii., iii., and iv., adopted in November, 1890.

A considerable amount of work has been effected under the Housing of the Working Classes Act, 1890.

Bye-laws.—Bye-laws are in force with reference to the following matters :—

New Streets and Buildings—allowed on July 23, 1894.

Nuisances— „ March 13, 1894.

Slaughter Houses— „ June 26, 1894.

Common Lodging Houses— „ March 13, 1894.

Telegraph and other Wires— „ May 30, 1893.

Regulations have been made as to dairies, &c., under the Dairies, Cowsheds, and Milkshops Order of 1885, and came into force on January 1st, 1889.

Isolation Hospital.—This district shares a joint hospital with the Boroughs of Stoke-upon-Trent and Hanley, and the Stoke Rural District. The hospital was erected on a site comprising six acres of land at Bucknall, near Stoke, at a

total cost of over £5,000, and contains 32 beds for a combined population of 101,093 persons (Census of 1891). No special number of beds is reserved for Fenton. The hospital is provided with a steam disinfecter and a one-horse ambulance.

Disinfecting Apparatus.—The District Council have just completed the erection of one of Reck's steam disinfectors in their own district. It is furnished with a door at each end, and separate rooms for infected and disinfected articles. Two covered hand-carts, for the transference of infected and disinfected articles, are now being constructed.

DIPHTHERIA.

LONGTON AND FENTON URBAN DISTRICTS.

These two Urban Districts form, as has been said, two of the five sub-districts of the Stoke-on-Trent Registration District.

Reference to the Quarterly Returns of the Registrar-General, for the years 1890 to the end of the 2nd quarter of 1898, shows that there was no special incidence of diphtheria mortality on either of these districts until the last half of the year 1896, as set forth in the following table:—

TABLE I., showing the DEATHS from DIPHTHERIA in the URBAN DISTRICTS of LONGTON and FENTON, quarter by quarter, from the commencement of the year 1890 to the end of the 2nd quarter of the year 1898; with the ANNUAL DIPHTHERIA MORTALITY per 1,000 of the population (estimated to the middle of each year) for Each District, for ENGLAND AND WALES, and for certain LARGE TOWNS.

Years.	LONGTON.						FENTON.						ENGLAND AND WALES.	"OTHER LARGE TOWNS."
	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	* Total.	Death Rate per 1,000.	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	Total.	Death Rate per 1,000.	Death Rate per 1,000.	Death Rate per 1,000.
1890	...	...	2	...	2	·059	...	...	1	...	1	·059	·18	·12
1891	...	...	2	1	3	·087	...	...	...	...	...	...	·17	·13
1892	...	...	...	...	...	...	1	...	...	1	2	·114	·22	·14
1893	1	1	...	2	4	·113	...	2	1	...	3	·168	·32	·19
1894	...	...	...	...	...	...	...	...	...	...	...	...	·29	·19
1895	...	1	1	...	2	·055	1	1	...	...	2	·107	·26	·23
1896	...	2	9	11	22	·596	1	...	2	7	10	·527	·29	·25
1897	23	8	30	39	100	2·673	11	5	9	12	37	1·913	·24	·24
1898	35	21	...	...	56	2·953†	12	12	...	...	24	2·431†	·22†	·28†
					½ yr.						½ yr.			

NOTE.—*N.B.*—In the Longton District there occurred, during the second quarter of 1897, 8 deaths from diphtheria and membranous croup; and, during the first quarter of 1898, 35 deaths from diphtheria, not 6 deaths and 34 deaths respectively, as stated in the Registrar-General's Quarterly Returns, owing to errors on the part of the local Registrar of Births and Deaths. For the second quarter of 1898 the Registrar-General's Return gives 20 deaths in the Longton District, whereas my list shows 21 deaths.

* The total deaths for each of the years, 1896 and 1897, and for the first half of 1898, as given in the above table for Longton, do not quite tally with the total deaths as given in Tables XI., XII., and XIII. The discrepancies are due to the fact that the years 1896 and 1897 in the above table are calendar years, and the first half of 1898 is a calendar half-year; whereas, the years in Tables XI. and XII. are each composed of a period of 52 weeks ended on the 52 Saturdays which fell within the limits of each calendar year, and the first half of 1898 in Table XIII. comprises the 27 weeks ended on Saturday, July 2nd, 1898. The grand totals are 178 in Table I. above, and 179 in Tables XI., XII., and XIII. The excess of one in the latter total is due to a death which occurred on July 1st, 1898, and which is, therefore, not included in Table I. above.

† Mortality of two quarters dealt with as if maintained throughout the year.

From this table it will be seen that, as stated on page 1 of this report, the deaths increased in number during the last half of 1896 to such an extent

that the death-rate for 1896 was, for each district, approximately double that for the whole of England and Wales, and considerably more than double that for "sixty-seven other large towns." The following year saw an alarming increase, the death-rate from diphtheria for Longton being eleven times, while that for Fenton was eight times as great as the corresponding rates for England and Wales, and for the 67 large towns. During the first quarter of 1898 the deaths in both districts presaged, if continued at a corresponding rate, a still higher death-rate for the current year.

It is obvious that for the production of so heavy a mortality over a protracted period of nearly three years, administrative measures in repression of the current diphtheria must have been lax or perfunctory, or local circumstances must have been exceptionally favourable to maintenance and distribution of infection.

In considering these points I am, as will presently appear, at a disadvantage, seeing that all throat illness other than that definitely recognised as diphtheria was practically ignored in both districts. With the facts to hand, however, I propose to deal once more with each district separately.

LONGTON DIPHTHERIA.

Before visiting Longton I had examined the returns of weekly notifications of diphtheria in that district from the commencement of 1896 to the week ending May 21st, 1898, with the result shown in the following table, subsequently extended to the end of the second quarter of 1898 :—

TABLE II.—Showing SUMMARIES of the WEEKLY NOTIFICATIONS of DIPHTHERIA in LONGTON for each Quarter from the beginning of 1896, with the ANNUAL ATTACK-RATES per 1,000 Inhabitants, estimated to the middle of each year.

Years.	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	Whole Year.	Attack-Rate per 1,000 Inhabitants.*	—
1896 ...	3	10	25	51	89	2·41	
1897 ...	65	58	135	314	572	15·29	
1898 ...	230	121	...	...	{ 351 } { ½ yr. }	18·50†	

* NOTE.—Throughout this Report all the Rates given, excepting, of course, those given for specified age-groups of a specified sex, are uncorrected for age and sex distribution.

† Attack-Rate in two quarters dealt with as if maintained throughout the year.

This table well illustrates the progress in time of the epidemic of throat disease recognised as diphtheria.

On my arrival at Longton I had a conference with the Mayor, the Town Clerk, the Medical Officer of Health, and the Inspector of Nuisances, when I obtained the following information :—Concurrently with the diphtheria there had existed a considerable amount of throat disease, spoken of by Mr. Dawes as "epidemic tonsillitis." No record was kept of these cases, nor was any trouble taken to hunt out such cases ; in fact, little importance appears to have been attached to them, and persons so suffering had been allowed to mix freely with their neighbours. No case of diphtheria had been traced to a pre-existing case of such "epidemic tonsillitis." Bacteriology, as an aid to diagnosis, had only been resorted to in a few instances in private practice, sometimes with positive, sometimes with negative results. Mr. Dawes had not heard of any instance in which paralytic symptoms had followed an attack of "epidemic tonsillitis." As regarded definite diphtheria, and considering the epidemic as a whole, the disease had been widely spread ; no one part of the borough had especially suffered, even those parts of the town which were

considered to be the least sanitary had not been distinguished by any special incidence. No evidence had been obtained which tended to incriminate the drainage or sewerage of the town, or the milk supplies, although careful attention had been given, it was stated, to these questions.

Preventive Measures which had been Adopted.

In dealing with notified diphtheria, procedure had been as follows:— On receipt of a notification by the Medical Officer of Health, information was sent to the Inspector of Nuisances, who visited the invaded house and gave instructions as to home isolation and the use of disinfectants. He also made inquiries as to school attendance, forbade attendance at school of all children from such infected house, made an inspection of the premises, and, sometimes, of other neighbouring premises; and any nuisances detected were remedied. Notice of infected houses and of children forbidden attendance at school was sent to school teachers. Re-attendance at school was allowed on belief that the medical attendant had stated that the patients were sufficiently recovered, verbal messages to this effect being accepted. On the completion of convalescence, the infected bedroom was disinfected by sulphur fumigation, and bedding, clothing, &c., were disinfected in a hot-air disinfectant. No elementary school was closed on account of the prevalence of diphtheria until October 13th, 1897, when the disease assumed such alarming proportions that the Authority compelled closure of all such schools. From that date the schools remained closed until January 3rd of this year. Their re-opening, as will be shown later, on p. 13, was followed by a sudden rise in the number of notifications of diphtheria, and they were, consequently, again closed from January 19th to April 18th. Since the last-mentioned date they have remained open with the exception of one week's holiday at Whitsuntide. As regards attendance at Sunday schools, it was stated that the Sunday schools were closed from October to January, while the elementary schools were closed. After the latter schools were again closed on January 19th, some of the Sunday schools were closed, and some remained open. The result of this diverse action was that the managers of the closed Sunday schools, feeling that they were being unfairly treated by the managers of the Sunday schools which remained open, re-opened the Sunday schools over which they had control, and all the Sunday schools have remained open since that time. After the elementary schools were closed last October, they were fumigated with sulphur. Orders, also, were issued for cleansing and whitewashing, but were not universally complied with, and were not enforced. There was no isolation in hospital of any diphtheria patients until April of this year, when use was made of the small so-called hospital, already described on p. 3, but the number of patients there isolated has been so small, when compared with the total number of attacks, as to be practically "a negligible quantity."

Agencies by which the Diphtheria may have been spread.

General sanitary circumstances and milk supplies in Longton have been carefully considered by me in relation to the diphtheria; but no facts were forthcoming tending to connect either the one or the other with prevalence of the disease. On the contrary, it became apparent, as my inquiry proceeded, that personal infection had been a main factor in the distribution of the diphtheria. In illustration of the influence of personal infection may be cited an exceptional incidence, in this instance, of the disease on persons of the female sex, who, in the absence of adequate hospital accommodation, and in circumstances in which, as a consequence of such absence of hospital accommodation, practically every case was treated and nursed at home, became beyond all others exposed to the disease.

In this connexion a table prepared by Dr. Downes showing the average annual numbers of deaths from diphtheria falling to each sex at various ages is of interest. This table, based on 68,880 deaths which occurred during

the period 1861 to 1880, is reproduced on pages 38 and 39 of the Milroy Lectures for 1891, by Dr. (now Sir Richard) Thorne Thorne.

From this table the following figures have been abstracted—

TABLE III., showing, for ENGLAND and WALES, the Average Annual Number of DEATHS from DIPHTHERIA at Certain Ages to 100,000 living at those ages.

	All Ages.	0-1	1-2	2-3	3-4	4-5	5-10	10-15	15-20	20-25	25-35	35-45	45-55	55-65	65-75	+75
Males ...	15	49	72	61	66	58	30	9	4	2	1	2	2	2	2	2
Females ...	15	37	67	66	75	69	38	13	5	3	2	2	1	2	2	1
Means ...	15	43	70	64	70	64	34	11	4	3	2	2	1	2	2	1

It will thus be seen that in England and Wales, though more females, aged from 2 to 3 years, died than males of similar age, there were nevertheless, in the whole age-group “under 3 years” more male than female deaths; in the next group, “3 to 15 years,” the mortality was greater among females, and markedly so as the age approached 15 years; and in the third group, “over 15 years,” the sexes practically balanced each other. For all ages they exactly balanced.

For Longton, the total yearly deaths from diphtheria among the different age-groups are given, for each sex, at the foot of each of the Tables XI., XII., and XIII. in the Appendix. For the whole period, January, 1896, to July 2nd, 1898, these totals are :—

—		Males.	Females.	Reduced to Annual Death Rates per 1,000 living at each Age-group.	
				Males.	Females.
Under 3 years ...		33	33	8·53	8·09
3 to 15 years ...		51	59	3·85	4·13
Over 15 years ...		3	0	·11	·0
Totals ...		87	92	All ages 1·928	1·911

Thus, in the Longton epidemic, the mortality-rate on males under 3 years old exceeded that on females of corresponding age; and the mortality on females, aged from 3 to 15 years, exceeded that on males of like age. Thus far there is correspondence between the Longton figures and Dr. Downes’s table. In the last group, however, there were 3 male to 0 female deaths, and not an equality of mortality as in Dr. Downes’s table. The figures in this last Longton group, however, are too small for any safe basis of inference. As matter of fact, and as regards *attacks* of recognised diphtheria, Tables XI., XII., and XIII., furnish the following figures :—

—		Notified Diphtheria.		Reduced to Annual Attack Rates per 1,000 living at each Age-group.	
		Males.	Females.	Males.	Females.
Under 3 years ...		72	71	18·60	17·41
3 to 15 years ...		271	344	20·47	24·13
Over 15 years...		91	163	3·25	5·47
Totals ...		434	578	All ages 9·62	12·005

From these figures it is seen that there was at Longton a considerable excess of incidence of diphtheria as such on females as compared with males in the age-groups over 3 years, and that excess of incidence was especially marked

in the case of females over 15 years of age ; whereas, judging from the mortalities in Dr. Downes's table, it might have been expected that the incidence on each sex over 15 years of age would be about equal, on the supposition, that is, that the case-mortality in the two sexes is approximately the same.*

The following figures, abstracted from Table XIV. in the Appendix, give the attack-rates in Longton on each sex, per 1,000 living over 15 years of age, for each quarter from January, 1896, to July 2nd, 1898 :—

Males, .09, .36, 0.0, .27, .18, .18, .71, 3.29, 2.11, .88.
Females .08, .25, .34, .76, .50, .17, 1.59, 4.27, 3.55, 2.06.

These figures again indicate an excessive incidence on females.

Thus, there was as the epidemic progressed a remarkable excess of incidence on females over 15 years of age, that is, on that portion of the population most exposed to infection when once introduced into households ; most exposed because, firstly, females spend more time indoors than males of corresponding age ; and, secondly, these persons would, presumably, be brought into still more intimate association with infection in consequence of their usually acting as nurses.

With this indication of the probable operation of personal infection in disseminating disease recognisable as diphtheria, careful attention was directed to the question of school influence to that end.

In Longton there are six voluntary schools and six board schools, as shown below :—

TABLE IV.—Showing the NAMES of the LONGTON ELEMENTARY SCHOOLS, and the NUMBERS of CHILDREN now on the BOOKS.

Six Voluntary Schools.				Six Board Schools.			
Names.			On Books.	Names.			On Books.
St. James's	...	...	797	Grafton Road	...	...	693
Dresden	...	...	403	High Street	...	...	764
Normacot	...	...	579	Normacot	...	...	683
St. Gregory's	...	...	621	Florence	...	...	757
Edensor	...	...	293	Cooke Street	...	...	926
East Vale	...	...	272	Woodhouse	...	...	824
TOTALS			2,965	+			4,647
				= GRAND TOTAL			7,612

On the assumption that the age distribution of the population in Longton is now much what it was for the Stoke Registration District as a whole at the census of 1891, the estimated number of children aged 3 to 15 years living at the middle of this year, 1898, would be 11,181 (*see* Appendix, p. 25). Thus, of the population of school-attending age living at the present time in Longton, some 68 per cent. are on the books of the twelve elementary schools.

In addition to the elementary schools, there are in Longton three small private schools, and the Longton Endowed School. The average attendance at the last-named school is given as 70. Among the children attending these four schools only one case of diphtheria has occurred, so far as is known to the

* NOTE.—The following statement bearing on these considerations is abstracted from the Report of the Medical Officer of the London County Council for the year 1896 :—"The age and sex distribution of the cases of diphtheria notified in London during 1896, are shown in the following table." The table shows that "females during the first four years of life were attacked in a smaller proportion than males, but at each subsequent age in greater proportion. The incidence of attack at "all ages" was, as in preceding years, greater on females than on males ; the incidence of death was, however, as in preceding years, greater on males than on females, this result being due to the greater incidence of death on males as compared with females in the first four years of life. After this period, the mortality among females was greater than that among males. The fatality, (case-mortality) of diphtheria was at 'all ages' greater among males than females. When each age is considered it is seen that during the first two years of life the fatality among males was greater than that among females, but during the next three years the fatality among females was greater than that among males."

Medical Officer of Health, during the epidemic, and, from the point of view, therefore, of notified diphtheria, further consideration of these four schools is not needed.

As regards the influence of the twelve elementary schools in fostering diphtheria, this, as has been said, must needs be judged of in reference to notified attacks of diphtheria *alone*. Data as to other forms of sore throat (many of them doubtless diphtheritic) do not exist; the Local Authority, in dealing with the epidemic, practically ignored attacks of this class. Limitation, however, in this sense of the attacks dealt with to notified "diphtheria," besides excluding "sore throats," excludes, also, from consideration, 16 attacks (10 in 1897, 6 in 1898) of membranous croup; but, in view of the circumstance that notified diphtheria attacks in Longton exceeded 1,000 in number, disregard of the above 16 croup cases cannot materially affect the statistics respecting definite diphtheria which I adduce.

Upon a hypothesis that, diphtheria having been set going in the place, maintenance and spread of the disease have been largely due to opportunities afforded children during their attendance at school for exposure to throat-infection, actually or potentially diphtheritic, some, if not all, of the following *expectations* should, on review of the behaviour of the observed "diphtheria," be found to have been fulfilled.

1. At the commencement of the epidemic there should have occurred an undue proportion of "first-cases-in-houses" among children of school-age attending school, say, from 3 to 15 years of age.

This unquestionably was the case so far as notified diphtheria was concerned; whether it was, or was not, the case if "tonsillitis" be included with diphtheria no one can say.

2. At the commencement of the epidemic there should have occurred some special incidence of definite diphtheria on the children attending some one school (or, possibly, more than one), and, therefore, presumably, on the area (or areas) from which children attending that school (or those schools) were drawn.

The Inspector of Nuisances informed me that this was the case at Longton, the area known as Sandford Hill, and served by Woodhouse school, having afforded the majority of notifications of diphtheria at the commencement of the epidemic in 1896. He further stated that the outbreak was in connection with Woodhouse school; that notifications were almost entirely confined to that district for about six weeks, only a few notifications coming from various other parts of the town; and that afterwards the disease spread to the neighbourhood of East Vale and to the schools there. In support of this statement the following table, based on one contained in the Special Report on diphtheria of the Medical Officer of Health for Longton, dated March 22nd, 1897, is submitted.

TABLE V., showing the ESTIMATED POPULATIONS of, and the INCIDENCE of DIPHTHERIA (notified) on, the various WARDS of LONGTON during the year 1896.

Wards.	Populations.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Totals.
St. John's ...	3,902	1	...	...	...	...	...	2	...	2	...	11	13	29
Dresden ...	3,294	1	...	...	...	...	1	...	...	...	1	...	...	3
Sandford Hill ...	4,509	...	1	...	...	...	2	11	5	1	...	7	6	33
Market ...	3,952	...	...	...	1	...	...	...	...	...	...	...	1	2
Sutherland ...	4,028	...	...	...	...	3	...	1	...	...	...	2	1	7
Florence ...	3,538	...	...	...	...	1	...	...	...	...	1	3	...	5
Meir ...	3,094	...	...	...	...	1	1	1	...	...	...	...	4	7
St. James's ...	3,598	...	...	...	...	...	2	...	...	...	...	...	...	2
St. Paul's ...	3,508	...	...	...	...	...	...	...	...	...	1	2	1	4
Normacot ...	3,476	...	...	...	...	...	...	...	...	...	...	...	...	0
Totals ...	36,899	2	1	0	1	5	6	15	5	3	3	25	26	92

It will thus be seen that, of a total of 92 recognised attacks of diphtheria which occurred during the year 1896, no fewer than 62 attacks occurred in Sandford Hill and St. John's Wards (which adjoin) with a combined estimated

population of 8,411 persons ; while the remaining 30 cases were distributed in seven wards having a combined estimated population of 25,012 persons. The remaining (tenth) ward, viz., Normacot, with an estimated population of 3,476 persons, was the only one from which there was not a single notification during 1896.

3. Also at the commencement of the epidemic, there should have occurred an excess of incidence of definite diphtheria on children of school-attending age.

The subjoined table, in which the notified attacks falling to each age-group have been reduced to percentages of total attacks, shows an absolute excess of incidence on children of school-age.

TABLE VI. (abstracted from TABLE XV. in Appendix, p. 26), showing for LONGTON, PERCENTAGE OF TOTAL NOTIFIED ATTACKS falling to EACH AGE-GROUP during EACH QUARTER and during EACH YEAR.

Age-Groups.	1896.				1897.				1898.				1896.	1897.	1st Half 1898.
	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	1st Quarter.	2nd Quarter.					
	Sporadic Period.				Epidemic Period.										
Under 3 years	...	...	20	11.8	18.5	12.1	12.6	14.7	15.2	12.4	...	...	12.4	14.3	14.2
3 to 15 ,,	33.3	30	64	64.7	69.2	81	67.4	57.3	55.7	58.7	...	...	59.5	63.5	56.7
Over 15 ,,	66.7	70	16	23.5	12.3	6.9	20	28	29.1	28.9	...	...	28.1	22.2	29.1
Quarterly Notifica- tions.	3	10	25	51	65	58	135	314	230	121	...	...	Year's Notifica- tions.		$\frac{1}{2}$ Year's Notifica- tions.
													89	572	351

The next table, in which the attack-rates per 1,000 living in each age-group at the middle of each year are shown, quarter by quarter, illustrates a relatively larger excess of incidence on children of the school-age group.

TABLE VII. (abstracted from TABLE XIV. in the APPENDIX, p. 25), showing for LONGTON, ATTACK-RATES per 1,000 living in EACH AGE-GROUP at the middle of each year, quarter by quarter, from the commencement of 1896 to date; and also showing ANNUAL ATTACK-RATES per 1,000 of EACH AGE-GROUP.

Age Groups	1896.				1897.				1898.		Rates for Complete Years.			
	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	1st Quarter.	2nd Quarter.				
	Sporadic Period.				Epidemic Period.						1896.	1897.	1898, 1st Half.*	Mean Rate for Period of 2½ Years.
Under 3 years	...	...	1·59	1·91	3·76	2·19	5·33	14·43	10·83	4·64	3·50	25·71	30·94	17·99
3 to 15 years	·09	·27	1·47	3·03	4·08	4·26	8·25	16·32	11·44	6·35	4·87	32·91	35·60	22·36
Over 15 years	·09	·31	·17	·52	·34	·17	1·16	3·79	2·85	1·49	1·09	5·48	8·68	4·39
Numbers of Quarterly Notifications											Rates at all Ages.			
	3	10	25	51	65	58	135	314	230	121	2·41	15·29	18·50	10·85

* Attack-rate in two quarters dealt with as if maintained throughout the year.

The annual attack-rates per 1,000 on the whole population for 1896, = 2·41 ; for 1897, = 15·29 ; and for 1898 (on basis of 1st half-year) = 18·50. For the first quarter of 1898 the rate of attack was equivalent to an annual attack-rate of 24·26 per 1,000 inhabitants.

From these two tables it may be seen that there was, especially during the earlier stages of the epidemic, a marked excess of incidence, relative as well as absolute, of definite diphtheria on children of school-age as compared with persons above and below that age. Of course, it may be said that, as children are more susceptible than adults, a heavy attack-rate on children under 15 years of age was to be expected. This is true ; but the above tables show a large excess of incidence on children of school-age over that *on infants under 3 years of age*, who may be considered, along with children of school-age, to form the most susceptible part of the population. For this excess of incidence of definite diphtheria on children of school-age there must be some reason apart from home, or general sanitary, influences, which are the same in both age-groups.

4. At a later period of the epidemic, owing to increasing opportunities of home-infection, there was to be looked for not only a growing incidence of definite diphtheria on the population generally, *i.e.*, on each of the three age-groups—under three years, 3 to 15 years, and over 15 years—but an increasing incidence on persons above and below school-age proportionately greater than any corresponding increase of incidence on children of school-age ; on non-school-attendants of both sorts, because of an almost necessarily diminishing amount of susceptible material in the school-age group, and especially on children under 3 years of age on account of their greater proneness to attack than persons over 15 years of age.

The facts recorded in Tables VI. and VII. show that the notified diphtheria behaved at Longton much in this fashion. For instance, if the attack-rate for each age-group in each of the last six quarters of the epidemic period be expressed as a multiple of the attack-rate for that age-group in the immediately preceding quarter, the following figures are arrived at* :—

	Four quarters of 1897.				First two quarters of 1898.	
Under 3 years.	1	·58	2·43	2·71	·75.	·43.
3 to 15 years.	1	1·04	1·94	1·98	·70.	·56.
Over 15 years.	1	0·50	6·82	3·27	·75.	·52.

These figures show very clearly that there was greater increase of diphtheria in the age-groups above 15 years and below 3 years than in group 3–15 years after the third quarter of the epidemic period, *i.e.*, after the second quarter of 1897 ; and, further, that after the epidemic began to decline, the incidence on these two groups declined more quickly than the incidence on children of school-age.

5. As a result of the epidemic period, as a whole, there should be found an excessive incidence on children of school-age, if not absolutely, at least proportionately to the number of such age living.

Tables XI., XII. and XIII., in the Appendix, pp. 22, 23, 24, show that at Longton, during the year 1896, there were 53 attacks of children of school age to 36 attacks of those above and below that age ; during 1897 there were 363 attacks to 209 attacks respectively ; and during the first half of 1898 there were 199 attacks to 152 respectively. During the 2½ years ended July 2nd, 1898, the attacks numbered 615 and 397 respectively.

From the figures given above, and from the estimated populations given on page 25 in the Appendix, we get the following attack-rates per 1,000 living of each age-group at the middle of each year.

1896 :	Children of school-age	= 4·87.	Others	= 1·38 ; viz.,	{ Under 3 years = 3·50.
					{ Above 15 " = 1·09.
1897 :	"	= 32·91.	"	= 7·92 ; "	{ Under 3 " = 25·73.
					{ Above 15 " = 5·48.
1898 :	"	= 35·60.†	"	= 11·36 ; † "	{ Under 3 " = 30·94.†
					{ Above 15 " = 8·68.†

* Explanation.—These figures indicate the rate of increase or decrease of “ the attack-rate ” of each quarter over that of the immediately preceding quarter, thus, under 3 years the attack-rate in the second quarter was ·58 that in the first quarter, in the third quarter 2·43 that in the second quarter, &c.

† Attack-rate in two quarters dealt with as if maintained throughout the year.

Thus, absolutely, children of school-age suffered definite diphtheria in the proportion of 1·55 to 1 to the rest of the population ; while, relatively to their number, they suffered in the proportion of 124 to 100 infants under 3 years of age, and in the proportion of 504 to 100 older persons.

6. Throughout the epidemic prevalence of the diphtheria the number of weekly notifications should tend generally to be high during school operations, and to fall in periods of school closure ; especially might there be looked for, *shortly after school-closure*, notable decline of notified diphtheria, and, *shortly after re-opening of schools*, fresh increase of such disease.

Appended to this Report is a chart recording for Longton weekly diphtheria notifications and weekly diphtheria deaths, and exhibiting also periods of school operations and periods of school closure. The chart is imperfect, of course, in that it of necessity ignores attacks of throat illness not recognised as diphtheria. And similarly it is imperfect for the reason that it takes cognisance of weeks of notification, not weeks of attack. But with these reservations the chart may be thought of as representing in a broad and general way the behaviour of Longton diphtheria in relation with school operations. Examination of this chart does not, up to the middle of August, 1897, afford suggestion of a correspondence of the sort referred to ; it could hardly do so, seeing that not until the summer holidays, 1897, were the schools closed for a period sufficiently long to afford indication as to whether or not they were fostering diphtheria.

After the summer holidays of 1897, however, the chart does, having regard to the incubation period of the disease, exhibit a rise and fall of diphtheria notifications roughly parallel with school operations. The schools re-opened on August 16th, the Monday following a week during which 17 cases were notified. During the first two weeks of the school term there were, respectively, 7 and 4 cases ; and then, in seven successive weeks to October 16th, there were 20, 26, 18, 15, 33, 27, and 36 notifications. On October 13th the schools were closed, and they remained closed until January 3rd, 1898. During the next two weeks of October, notifications were 19 and 43 ; but from this point, October 30th, there was considerable diminution of notified cases as shown by the following figures for successive weeks, viz., 19, 25, 19, 27, 18, 24, 14, 10, 16. The last figures (16) refer to the week ended January 1st, 1898. On January 3rd the schools re-opened, and during the first week of school attendance 22 cases were notified, followed during the second week by 45 cases (week ended January 15th). The schools were, therefore, again closed on January 19th, and remained closed until April 18th. During the week, ended January 22nd, there were 16 notifications, followed in successive weeks by 21, 14, 12, 15, 11, 16, 23, 8, 11, 6, 5, and 7 for the week ended April 16th. On April 18th the schools re-opened, and have remained open with the exception of one week's holiday at Whitsuntide. Since the schools re-opened the weekly notifications have numbered 8, 15, 13, 15, 8, 12, 6, 6, 6, 5, 9. Thus it will be seen that the re-opening of the schools in August, 1897, was followed by an unprecedented and maintained outburst of definite diphtheria ; that their closure in October was followed by a considerable and, on the whole, increasing reduction of the number of weekly notifications until the schools were re-opened in January, this year, when there was a sudden rise to the highest point reached, in notification ; and that after the schools again closed there was again reduction in the number of notified cases, until the schools re-opened in April, at a time when seasonal decline of diphtheria might have been expected to have set in.

Thus it is seen that, although no parallelism is detectable between the diphtheria notifications and school operations prior to August, 1897, from that time onward there is observable—having regard to the reservations I have noted—a parallelism of a sort consistent with much of the prevalence of the disease in Longton having been due to school attendance.

FENTON DIPHTHERIA.

As in the case of Longton, I had, before visiting Fenton, examined the returns of weekly notifications of diphtheria in Fenton from the commencement of 1896, with the result shown in the following table, since amplified to take in the second quarter of 1898.

TABLE VIII., showing SUMMARIES of the WEEKLY NOTIFICATIONS of DIPHTHERIA in FENTON for EACH QUARTER from the beginning of 1896, with the ANNUAL ATTACK-RATES PER 1,000 INHABITANTS estimated to the middle of each year.

Years.			1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	Whole Year.	Attack-Rate per 1,000 Inhabitants.
1896	...	...	5	1	3	29	38	2·006
1897	...	...	31	20	22	35	108	5·585
1898	...	...	67	48	...	...	{ 115 ½ yr. }	11·653*

* Attack-rate in two quarters dealt with as if maintained throughout the year.

On my arrival at Fenton, I had a conference with the Clerk to the District Council, the Medical Officer of Health, and the Inspector of Nuisances, when I obtained the following information :—There had been no especial incidence of the diphtheria on any one school ; the disease had been generally distributed throughout the district. There had been epidemic sore throat, which was not regarded clinically as diphtheria, at Mount Pleasant. There had been no paralysis following attacks of this disease, and paralysis had been rare after attacks of diphtheria. Bacteriology had not been employed as an aid to diagnosis. People intermingled to a great extent, and the Medical Officer of Health had known of cases of diphtheria arising in this way. No reason existed for attributing the prevalence of the disease to insanitary circumstances or to milk supplies.

Preventive Measures which had been Adopted.

On receipt of a notification of diphtheria, the invaded premises had been visited, and inquiries made as to the source of the disease, the number of children in the dwelling, and especially as to school attendance. Instructions as to home-isolation and disinfection had been given. School attendance had been forbidden until after the lapse of six weeks from the occurrence of the last case. After convalescence, the infected rooms were fumigated with sulphur. In addition to formal notification of cases of diphtheria by medical practitioners, the School-Attendance Officer has informed the Medical Officer of Health of cases which came under his notice. As regards isolation, the number of patients removed to hospital was small, viz., during 1896, five cases ; during 1897, eight cases ; and during 1898, up to June 8th, eight cases. Of the 21 cases removed to hospital, 19 were sent to the Joint Hospital at Bucknall, and 2 were removed to the North Stafford Infirmary. None of the schools were closed solely on account of diphtheria until June of 1898, but, on account of the prevalence of measles, seven schools were closed during February and March of this year.

Agencies by which the Diphtheria may have been spread.

There being, as I learned, no facts forthcoming to connect the prevalence of diphtheria in Fenton with general sanitary circumstances or milk supplies, attention was next directed, as in the case of Longton, to personal infection and to school influence. In the present instance it may suffice to deal with the facts in a broad and general way. In the Appendix will be found all the data thus dealt with.

In the case of Fenton there was an excess of incidence of notified diphtheria on females, not only at “all ages,” but also at each age-group ; and this incidence is apparent whether viewed from the standpoint of death-rates or of attack-rates. It is, moreover, notable that the excessive incidence on females as compared with the incidence on males was, in the case of Fenton, much more marked than the corresponding excessive incidence in the case of Longton. The following figures verify this statement.

The diphtheria deaths in Fenton were distributed as shown below :—

	Males.	Females.	Reduced to Annual Death-Rates per 1,000 living at each Age-group.	
			Males.	Females.
Under 3 years ...	14	15	6·88	7·25
3 to 15 years ...	15	26	2·13	3·63
Over 15 years...	0	1	·00	·07
TOTALS ...	29	42	At all ages 1·21	1·73

In these figures is seen the fact that not only did the deaths of females under 3 years of age exceed those of males of like age, but that there was an unusual excess of mortality on females, as compared with males, of the age-group 3–15 years.

Tables XVI., XVII., and XVIII. (pages 27–29) furnish, for Fenton, the following figures showing the total notified attacks from January, 1896, to July 2, 1898 :—

	Males.	Females.	Reduced to Annual Attack-Rates per 1,000 living at each Age-group.	
			Males.	Females.
Under 3 years ...	25	27	12·29	13·05
3 to 15 years ...	74	104	10·52	14·53
Over 15 years...	11	20	·74	1·33
TOTALS ...	110	151	At all ages 4·61	6·22

From these figures it will be seen that females aged 3–15 years suffered a very much heavier attack-rate, as compared with males, in Fenton than in Longton ; and that, as in the case of Longton, females over 15 years of age have suffered greatly in excess of incidence as compared with males of corresponding age.

The following figures are abstracted from the same tables, and show the attacks on each sex, over 15 years, for each quarter from the commencement of 1896.

Males ...	0	0	0	0	0	1	2	3	4	1	= 11
Females ...	0	0	1	2	1	2	2	3	8	1	= 20

The excess on females is especially marked during the first quarter of 1898 when the notified diphtheria was most abundant.

There are in Fenton eight elementary schools, as shown below.

TABLE IX., showing the NAMES of the FENTON ELEMENTARY SCHOOLS, and the NUMBERS of CHILDREN now on the BOOKS.

Five Voluntary Schools.				Three Board Schools.			
Names.		On Books.		Names.		On Books.	
St. Matthew's ...	...	398		Queen Street ...	...	535	
St. Michael's ...	...	259		Market Street ...	...	1,032	
St. Mary's ...	...	127		Heron Cross ...	...	745	
Central ...	...	668				...	
Mount Pleasant ...	...	445				...	
Total ...	...	1,897		Total ...	...	2,312	
GRAND TOTAL ... 4,209							

From the figures on page 29 of the Appendix it will be seen that the estimated number of children of school-age, at the middle of this year, is 5,818.

Thus, some 72 per cent. of children aged from 3 to 15 years are on the books of the Fenton elementary schools.

In addition to the above schools there are two private schools in Fenton. Only two cases of diphtheria occurred, so far as is known to the Authority, in connection with one of these schools, the other apparently remaining free from the disease throughout.

Passing now to the question of diphtheria-influence of elementary schools—

1. *As to an undue proportion at the commencement of the epidemic of "first-cases-in-houses" among children of school-age attending school:—*

I casually visited nine houses in Fenton which had been infected with diphtheria at various dates, and from the facts recorded below it will be seen that, though the information gained had no direct bearing on the question of "first cases" at the commencement of the epidemic, it was, nevertheless, in accord with belief that, generally, "first cases" occurred among children attending school.

a. Two cases. The first case was that of a child, aged about 11 years, who died in hospital. She was taken ill 3 days or so after the closing of St. Gregory's School, in Longton, during last October, which school she had been attending until it closed.

b. Two cases. The first case was that of a boy. He last attended St. Matthew's School on a Friday. On the following Monday and Tuesday he did not attend as "he did not feel quite so well." On the following day, Wednesday, in the evening, he was found to be suffering from diphtheria, and he died on the following Friday. On the following Wednesday a child in this family, aged 1 year, was attacked. These cases occurred in November, 1897.

c. House adjoining the last mentioned. Three weeks after the first case in house b, a child, aged 1 year and 8 months, was taken ill with diphtheria, and died. It was affirmed that there had not been any intervisiting.

d. In this house, a boy, aged 6 years, was taken ill with diphtheria on a Thursday. He had been at St. Matthew's school for the preceding three days and on the Thursday morning, having previously been absent for some time on account of an attack of chicken-pox. He died on the following Saturday week. About a fortnight afterwards his mother suffered from "an ulcerated sore-throat."

e. A girl, aged 10 years, last attended one of the private schools on a Friday, and was taken ill with diphtheria on the same day. (One other child attending the same school had diphtheria.)

f. Mrs. L. had diphtheria about the latter part of February last, possibly infected by her brother after his return from hospital (*see* next case).

g. A boy, aged 16 years, who worked in a pottery, was taken ill with diphtheria, and removed to hospital, from which he returned two weeks before Christmas. His voice was thick and nasal for some time, but got better about Christmas. He frequently visited his sister at house f.

h. A girl, aged 5 years, was at St. Matthew's School on Thursday, was taken ill with diphtheria on Friday, removed to hospital on Saturday, and died on the following Wednesday, December 15th, 1897.

i. Boy, aged 5 years, was at Market Street School on a Friday morning, was taken ill with diphtheria at dinner time, and died on the following Tuesday, April 19th last. His sister, aged 7 years, was taken ill on April 20th.

Thus, in six of the nine houses visited the first cases were those of children who may be said to have been attending school up to the time of their attack. Of the remaining three houses, one was adjoining a previously infected house, one of the six above; while the remaining two houses, inhabited by a brother and sister who both suffered, did not appear to have been infected through school attendance.

2. *As to a special incidence at the commencement of the epidemic on the children attending some one school (or, possibly, more than one), and, therefore, presumably, on the area (or areas) from which children attending that school (or those schools) were drawn.*

I am not able to submit any facts, as regards Fenton, in support of this expectation.

3. *As to a special incidence at the commencement of the epidemic on children of school-attending age.*

The following table (X.) shows at the very beginning of the epidemic, *i.e.*, in the last quarter of 1896, a transient special incidence in Fenton of notified diphtheria on children 3–15 years. Similarly it shows in 1898 a very special incidence at this age. But in the interval, during 1897, as a whole, infants 0–3 years are seen to have suffered, relatively to their numbers, much in excess of school children.

TABLE X., showing NOTIFIED ATTACKS of DIPHTHERIA in FENTON on EACH AGE-GROUP, QUARTER by QUARTER, from January 1896 to June 1898, and for COMPLETE YEARS.

Age Groups.	1896.				1897.				1898.		1896.	1897.	1st Half 1898.	Annual Rates per 1,000 living at each Age Group.						
	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	1st Quarter.	2nd Quarter.				1896.	1897.	1st Half 1898.	1896.	1897.	1st Half 1898.	Whole Period of 2½ yrs.
Under 3 years...	1	0	1	4	16	4	2	10	2	12	6	32	14	3.72	19.42	16.65	12.67			
3 to 15 years ...	4	1	1	23	14	13	16	19	53	34	29	62	87	5.19	10.88	29.90	12.54			
Over 15 years ...	0	0	1	2	1	3	4	6	12	2	3	14	14	0.26	1.17	2.29	1.04			
														At all Ages.						
TOTALS ...	5	1	3	29	31	20	22	35	67	48	38	108	115	2.006	5.59	11.65	5.42			

4. *As to an increasing incidence as the epidemic progressed on persons above and below school-age proportionately greater than any corresponding increasing incidence on children of school-age.*

Table X. does not show this for Fenton : on the contrary it shows, as the epidemic grew to its largest proportions, decrease of incidence on infants 0–3 years, and increase of incidence on older children. The circumstance indeed that infants suffered their maximum notified diphtheria early in the outbreak and before children 3–15 is the special feature of the Fenton epidemic, and it tends to indicate that in this town, during 1897, at any rate, personal infection, in so far as it was responsible for spread of the diphtheria, was operating in the homes of the people to a far greater extent than through schools.

5. *As to an excessive incidence in the epidemic period, as a whole, on children of school-age, if not absolutely, at least proportionately to the number living at such age.*

As table X. also shows, this was not seen at Fenton. It is true that children 3–15 years suffered more (in the proportion of 5 to 1) notified diphtheria than infants and older persons collectively : nevertheless, infants as such themselves suffered even more than school children.

6. *As to rise and fall of weekly notifications parallel severally with school operations and school closure.*

Appended to this Report is a chart for Fenton for 1896, 1897, and the first half of 1898, recording weekly diphtheria notifications, weekly diphtheria deaths, and periods of school-closure. From this chart it will be seen that the schools have not been closed on account of diphtheria ; that closure of schools for the summer holidays of 1897 was not followed by reduction of the current notified diphtheria, nor their re-opening in the autumn of that year by any conspicuous increase ; and that not until 1898, when diphtheria notifications had become most abundant, and when (as seen from Table X.) children aged 3–15 years were suffering beyond all other persons from that malady, is there even rough indication of inter-relation of school operations and the behaviour of diphtheria.

CONCLUDING CONSIDERATIONS.

It is clear from a perusal of this report that the behaviour of definite notified diphtheria has been by no means identical in the two districts of Longton and Fenton.

On comparing the mean diphtheria attack-rates of Longton and Fenton, it appears that Fenton has, as regards definite diphtheria, suffered during two and a half years an attack-rate less by one half than that of Longton. The rates are 5·421 per 1,000 for Fenton, and 10·85 per 1,000 for Longton. Nevertheless, in the same period, Fenton has been subject to a diphtheria mortality less by scarcely one quarter that of Longton. The mean death-rates per 1,000 for the $2\frac{1}{2}$ years are—Fenton = 1·475, and Longton = 1·919. As a result, the mortality per 100 notified cases is for Fenton = 27·203, and for Longton = 17·688. This means : either that diphtheria as such has been, in proportion to total cases, more fatal in Fenton than in Longton, or that a larger proportion of definite diphtheria attacks have gone unrecognised in the former place than in the latter. Which is the explanation I am unable to say, the information procurable at the date of my visit not sufficing for definite conclusion. It may not, however, be altogether unprofitable to discuss briefly some of the questions here involved.

Two questions, therefore, present themselves for consideration, namely, *Relative Prevalence* in the two districts, and the corresponding *Relative Mortality*.

RELATIVE PREVALENCE.

Longton attacks per 1,000 for $2\frac{1}{2}$ years, stated as a mean attack-rate in $2\frac{1}{2}$ years = 10·85.

Fenton attacks per 1,000 for $2\frac{1}{2}$ years, stated as a mean attack-rate in $2\frac{1}{2}$ years = 5·421.

In considering the causes which conduced to such a difference in the attack-rates in the two districts it will be necessary to review the action taken by the two Sanitary Authorities to prevent spread of infection. The action taken by the Longton Town Council is recorded on pages 6 and 7 of this report, while that taken by the Fenton District Council will be found on page 14. It is obvious from the information given on the pages referred to that the procedures of both Authorities have fallen very far short of those necessary for control of such serious epidemics.

Omissions common to both Authorities.

No special attention appears to have been paid to cases of sore-throat other than notified cases of diphtheria ; unnotified disease of this class was not sought out and recorded, and no special steps were taken to exclude children, so suffering, from school ; notified cases of diphtheria were not looked on as possibly indicating centres of infection, and house-to-house visits were not made in their neighbourhood with a view to discovering other cases which had not been notified ; there was no attempt at securing auxiliary notification from school teachers, the clergy, or district visitors ; no medical practitioner was appointed to examine the throats of children while in actual attendance at school ; and no regard appears to have been paid to the possibility of some schools being more affected by diphtheria than others, and, therefore, of their requiring to be specially dealt with.

Differences in Action taken by the two Authorities.

As has been already pointed out, the elementary schools of Longton were not any of them closed until, in the autumn of 1897, diphtheria had assumed

these alarming epidemic proportions ; whereas, not until June 1898 was it deemed necessary to close any Fenton school on account of prevalence of this disease. For the rest, differences of procedure in the two places were in the main as follows :—

LONGTON.

1. No information from the School Attendance Officer.

2. Children from infected houses allowed to re-attend school on merely affirming that they had leave from their family medical attendant.

3. Isolation in hospital.—Practically none, and such as there was did not commence until April of this year.

FENTON.

1. The Medical Officer of Health states :—
“ I have received most valuable information
“ as to fresh cases of diphtheria from the
“ School Board Attendance Officer.”

2. Children from infected houses forbidden to attend school until after the lapse of six weeks from the occurrence of the last case.

3. Isolation in hospital.—Five patients out of 38 in 1896 ; eight cases out of 108 in 1897 ; and eight cases out of 89 up to June 8th this year.

As to these other differences, there is little to choose as regards No. 3 between Longton and Fenton practice ; in neither case was removal of diphtheria to hospital adopted to an extent likely to have repressed the disease, but as regards contrasts, Nos. 1 and 2, the advantage would appear to have been distinctly in favour of Fenton. Thus :—

1. It is obvious that, if early information has been frequently received by Mr. Griffiths from the Fenton School Attendance Officer with respect to fresh cases of diphtheria, he (Mr. Griffiths) may have been able to control attendance and re-attendance at school far better than he could have done in the absence of such information. 2. The difference between Longton and Fenton here is also important. I do not mean to say that an interval of six weeks from the last case invariably suffices for complete recovery and for getting rid of all infectivity, but the Fenton custom is, I think, likely to have proved the safer in practice ; at Longton there were no means of checking false statements, and little doubt can be entertained that many children there returned to school after attack in still infectious condition.

As to the nature of some dominant condition in Longton tending powerfully to spread infection, I think it probable that such factor is to be sought in connection with attendance at the Longton elementary schools. It has been shown that in Longton children of school-age suffered absolutely and relatively more than either those under or those over school-age, and more than the latter two classes combined. Whereas in Fenton this was *not* the case ; for, although children of school-age suffered absolutely and relatively more than the remainder of the population, nevertheless, relatively to their numbers they suffered somewhat less than infants under three years of age. It appears to me that the probable explanation of this diverse behaviour of diphtheria in the two districts is that the disease invaded a larger proportion of the Longton than of the Fenton schools. That the latter schools were not, at any rate, nearly so seriously affected is obvious on comparison of the attack-rates for Longton given in Table VII. on page 11 with those for Fenton given in Table X. on page 17. The fact that in Fenton during 1897 the attack-rate on infants under three years of age was nearly double that on children of school-age is altogether consistent with the greater prevalence of the disease in Longton having been largely due to the circumstance that the Longton schools became seriously and widely involved at an early date in the epidemic, whereas those in Fenton appear to have escaped serious implication until the end of 1897 and the beginning of 1898. As to this, charts representing the diphtheria curve of incidence on each of the Longton and Fenton elementary schools might have been of great value ; but in the absence of the needful data I have been unable to prepare such charts.

On the whole I am disposed to believe that the preventive measures—with inclusion of the regulation of school attendance—adopted in Fenton, though generally similar in kind to those practised at Longton, were as

matter of fact applied in a fashion that better tended to repress spread of throat-illness whether or not the current malady was regarded as definite diphtheria.

Relative Mortality.

Longton diphtheria deaths per 1,000 living for $2\frac{1}{2}$ yrs., stated as a mean death-rate =	1·919
Fenton " " " " "	= 1·475
Longton mortality per 100 notified cases in $2\frac{1}{2}$ years 	= 17·688
Fenton " " " " ...	= 27·203

It has already been stated that this high fatality (case-mortality) in Fenton may mean either that diphtheria has been of a severer type in Fenton than in Longton, and therefore more fatal, or that a large proportion of definite diphtheria attacks in Fenton has been unrecognised and unnotified. Conversely, it might signify, possibly, that many of the notified cases in Longton were not cases of true diphtheria; but this is less likely than that true cases of the disease in Fenton escaped notification. There is, however, one other consideration in this connection that must be borne in mind, namely, method of treatment; *i.e.*, whether or not diphtheria antitoxin was used. On inquiring as to this, I am informed by Mr. Dawes, the Medical Officer of Health, of Longton:—"I have to say that we, *i.e.*, myself, two partners and three "assistants, have used antitoxin extensively in the Infectious Diseases "Hospital and in general practice, and that we are all well satisfied with "the results, they being better in our opinion than those following "ordinary treatment." Similarly the Inspector of Nuisances of Longton informs me:—"So far as I can ascertain the majority of the cases in Longton "have been treated with antitoxin and with satisfactory results." With regard to Fenton, Mr. Griffiths, the Medical Officer of Health, writes:—"One "practitioner who has attended probably half the total number of cases, tells me "that he finds it" (Antitoxin) "of considerable service if used early enough. "Another has met with indifferent success. I have not used antitoxin "extensively and cannot say much for or against its employment." The Inspector of Nuisances of Fenton writes:—"I must confess I cannot answer "this question satisfactorily." What share, if any, difference of treatment had in modifying the relative mortality in the two districts it is impossible to estimate, even approximately. The replies received, and quoted above, are suggestive, but it would not be safe to draw any definite inference.

In endeavouring to ascertain the meaning of the excess of case-mortality in Fenton, I worked out the following percentages. They are of interest in this connexion:—

Longton—	Proportion of 100 deaths at age 3–15 yrs. falling to each sex :	males 46,	females, 54.
Fenton—	" " " " "	: 37	" 63.
Longton—	" " cases "	: 44	" 56.
Fenton—	" " " " "	: 42	" 58.

Longton—

For each 100 males, at age 3–15 yrs., attacked, 19 died; for each 100 females of same age, 17 died.

Fenton—

For each 100 males, at age 3–15 yrs., attacked, 20 died; for each 100 females of same age, 25 died.

Longton—

For each 100 males, under 3 yrs., attacked, 46 died; for each 100 females of same age, 46 died.

Fenton—

For each 100 males, under 3 yrs., attacked, 56 died; for each 100 females of same age, 56 died.

Certain of the above figures show that in the age-group 3–15 years the incidence of diphtheria attack was, per centum of total cases at that age, only slightly greater on females in Fenton than in Longton, whereas the mortality of females, as compared with males, per centum of total deaths at that age-group, in Fenton was out of all proportion greatly in excess of the mortality of females as compared with males of the corresponding age-group in Longton. Other figures show that below 3 years the case-mortality in each place was the same for both sexes. At ages over 15 years diphtheria deaths were, as has already been seen, so few as to be for present purposes negligible. It follows then that not only was there an excess of incidence of diphtheria on females aged 3–15 years in Fenton, but that, superadded to that excess there was a very heavy excess of mortality, and that this excess of incidence and excess

of mortality on females of the school-age group was mainly responsible for the case-mortality and death-rate being so high in Fenton in spite of a much smaller attack-rate in Fenton than in Longton. For this exceptional mortality of females of school-age, as compared with males of the same age, in Fenton, a difference of 26 per cent. of fatal cases, I cannot, in the absence of data which were not forthcoming, offer adequate explanation.

In conclusion, I wish to express my thanks for valuable assistance during my inquiry received at the hands of the Medical Officers of Health of the Longton and Fenton Districts, of the Superintendent Registrar of Births and Deaths of the Stoke Registration District, and of the Registrars of Births and Deaths for the Longton and Fenton Registration Sub-Districts. My thanks are also due to the Schoolmasters and Schoolmistresses throughout both districts. To Mr. Cooke, the Inspector of Nuisances for Longton, and to Mr. Thornton, the Inspector of Nuisances for Fenton, I am also indebted for much valuable help and information ; especially am I indebted to the former for having prepared for me Tables XI., XII., and XIII., and to the latter for having prepared Tables XIV., XV., and XVI., tasks which must have involved much patient labour.

WILFRED W. E. FLETCHER.

July, 1898.

APPENDIX.

TABLE XI., showing WEEKLY NOTIFICATIONS of and DEATHS from DIPHTHERIA, during 1896, in the BOROUGH of LONGTON.

1896. Week ending		Notified Cases.									Deaths.								
		Ages.						Total each Sex.		Total both Sexes.	Ages.						Total each Sex.		Total both Sexes.
		Under 3 years.		3 to 15 years.		Over 15 years.		M.	F.	Both.	Under 3 years.		3 to 15 years.		Over 15 years.		M.	F.	Both.
M.	F.	M.	F.	M.	F.	M.	F.				M.	F.	M.	F.					
January	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
February	1	...	...	1	...	1	...	2	...	2	...	...	...	...	...	...	...	...	...
	8	...	...	...	...	...	1	...	1	1	...	...	...	...	...	...	...	...	...
	15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
March	7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
April	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	11	...	...	...	...	...	1	...	1	1	...	...	...	...	...	...	...	...	...
	18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
May	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	9	...	...	...	...	...	1	...	1	1	...	...	...	...	...	...	...	...	...
	16	...	...	...	...	1	...	1	...	1	...	...	...	...	...	...	...	...	...
	23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	30	...	...	...	...	1	1	1	1	2	...	...	...	...	...	...	...	...	...
June	6	...	...	...	1	1	...	1	1	2	...	...	...	...	...	...	...	...	...
	13	...	...	...	...	1	...	1	...	1	...	...	...	...	...	...	...	...	...
	20	...	...	...	1	...	...	...	1	1	...	...	...	...	...	...	...	...	...
	27	...	...	...	1	...	...	...	1	1	...	...	...	...	...	...	...	...	...
July	4	1	...	2	...	...	...	3	...	3	...	...	1	1	...	...	1	1	2
	11	...	1	2	...	...	1	2	2	4	...	1	1	1	...	...	1	2	3
	18	...	...	4	...	...	...	4	...	4	...	...	1	...	...	...	1	...	1
	25	...	...	4	...	...	1	4	1	5	...	...	...	...	...	...	...	...	...
August	1	...	...	...	...	...	1	...	1	1	...	...	1	...	...	...	1	...	1
	8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	15	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1	1
	22	...	1	1	2	...	...	1	3	4	...	1	...	...	...	...	...	1	1
	29	...	...	...	...	...	1	...	1	1	...	...	...	...	...	...	...	...	...
September	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	12	1	...	1	...	...	...	2	...	2	1	...	...	...	...	...	1	...	1
	19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	26	1	...	...	...	...	...	1	...	1	1	...	...	...	...	...	1	...	1
October	3	...	...	...	1	...	...	...	1	1	...	...	...	...	...	...	...	...	...
	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	24	...	...	...	...	...	1	...	1	1	...	...	...	...	...	...	...	...	...
	31	...	...	...	...	...	1	...	1	1	...	...	...	...	...	...	...	...	...
November	7	...	...	...	1	...	...	...	1	1	...	...	...	1	...	...	...	1	1
	14	...	1	1	1	...	...	1	2	3	...	...	1	...	...	...	1	...	1
	21	...	...	2	2	...	1	2	3	5	...	1	1	...	...	...	1	1	2
	28	...	...	7	3	...	1	7	4	11	...	...	1	1	...	...	1	1	2
December	5	1	...	5	3	1	2	7	5	12	...	...	1	...	...	...	1	...	1
	12	1	...	1	1	...	2	2	3	5	1	...	...	...	...	...	1	...	1
	19	1	...	1	...	1	...	3	...	3	...	...	...	...	...	...	...	...	...
	26	...	2	1	3	1	1	2	6	8	...	1	...	1	...	...	...	2	2
Totals	...	6	5	33	20	8	17	47	42	89	3	4	8	6	...	...	11	10	21

TABLE XII., showing WEEKLY NOTIFICATIONS of and DEATHS from
DIPHTHERIA, during 1897, in the BOROUGH of LONGTON.

1897. — Week ending		Notified Cases.									Deaths.								
		Ages.						Total each Sex.		Total both Sexes.	Ages.						Total each Sex.		Total both Sexes
		Under 3 years.		3 to 15 years.		Over 15 years.					Under 3 years.		3 to 15 years.		Over 15 years.				
		M.	F.	M.	F.	M.	F.	M.	F.	Both.	M.	F.	M.	F.	M.	F.	M.	F.	Both.
January	2	..	..	1	2	..	..	1	2	3	..	..	..	1	..	..	..	1	1
	9	1	1	1	1	..	2	2	4	6	1	..	..	..	..	..	1	..	1
	16	..	..	..	..	1	1	1	1	2	..	..	..	..	..	..	..	..	0
	23	..	1	..	3	..	..	..	4	4	..	..	..	..	..	..	..	..	0
	30	..	..	3	4	..	1	3	5	8	..	2	..	1	..	..	..	3	3
February	6	1	..	1	1	..	..	2	1	3	1	..	..	..	..	..	1	..	1
	13	..	1	2	..	..	..	2	1	3	..	..	1	..	..	..	1	..	1
	20	1	..	1	1	..	..	2	1	3	2	..	..	..	..	..	2	..	2
	27	1	..	1	4	..	..	2	4	6	1	..	..	1	..	..	1	1	2
March	6	..	1	2	2	..	1	2	4	6	1	1	1	1	..	..	2	2	4
	13	..	1	2	3	..	..	2	4	6	..	..	1	1	..	..	1	1	2
	20	..	..	1	1	..	..	1	1	2	..	..	..	1	..	..	..	1	1
	27	..	3	5	3	1	1	6	7	13	1	..	2	..	..	..	3	..	3
April	3	..	2	1	9	1	2	2	13	15	1	..	2	..	..	..	3	..	3
	10	1	..	4	4	..	..	5	4	9	..	..	..	..	..	..	..	..	0
	17	..	..	1	1	..	..	1	1	2	..	..	1	..	..	..	1	..	1
	24	..	..	..	..	..	..	..	..	0	..	..	..	..	..	..	..	..	0
May	1	..	..	..	..	..	..	..	..	0	..	1	..	..	..	..	..	1	1
	8	..	..	2	1	..	..	2	1	3	..	..	..	..	..	..	..	..	0
	15	1	..	2	2	..	..	3	2	5	..	..	..	..	..	..	..	..	0
	22	..	..	..	1	..	..	..	1	1	1	..	1	..	..	..	2	..	2
	29	1	1	2	4	1	..	4	5	9	1	..	..	..	..	..	1	..	1
June	5	..	..	1	2	..	..	1	2	3	..	..	..	..	..	..	..	..	0
	12	..	..	1	..	..	..	1	..	1	..	..	..	..	..	..	..	..	0
	19	..	..	1	2	..	..	1	2	3	..	..	..	..	..	..	..	..	0
	26	..	1	3	3	..	..	3	4	7	..	1	1	..	..	..	1	1	2
July	3	..	1	2	2	..	2	2	5	7	..	1	1	..	..	..	1	1	2
	10	..	..	1	4	..	2	1	6	7	..	..	..	1	..	..	..	1	1
	17	1	..	1	2	..	1	2	3	5	..	..	..	1	..	..	..	1	1
	24	..	..	1	2	..	..	1	2	3	..	..	..	1	..	..	..	1	1
	31	..	..	..	3	..	..	..	3	3	..	..	..	2	..	..	..	2	2
August	7	..	..	1	2	..	..	1	2	3	..	..	..	2	..	..	..	2	2
	14	1	2	5	6	1	2	7	10	17	..	1	..	..	..	..	..	1	1
	21	2	..	2	2	..	1	4	3	7	1	1	3	2	..	..	4	3	7
	28	1	..	1	1	..	1	2	2	4	..	..	..	..	..	..	..	..	0
September	4	1	1	2	14	1	1	4	16	20	..	..	..	1	1	..	1	1	2
	11	2	2	9	6	4	3	15	11	26	1	1	2	..	..	..	3	1	4
	18	1	..	5	7	..	5	6	12	18	..	..	..	3	..	..	..	3	3
	25	1	1	5	5	2	1	8	7	15	1	..	..	2	..	..	1	2	3
October	2	2	3	11	14	1	2	14	19	33	..	..	2	1	..	..	2	1	3
	9	2	2	9	8	3	3	14	13	27	..	1	1	2	..	..	1	3	4
	16	3	3	15	11	2	2	20	16	36	3	2	..	..	..	..	3	2	5
	23	2	1	3	4	5	4	10	9	19	..	..	1	2	..	..	1	2	3
	30	3	4	8	10	7	11	18	25	43	..	1	..	2	..	..	..	3	3
November	6	..	1	4	7	3	4	7	12	19	..	..	1	1	..	..	1	1	2
	13	4	..	4	11	2	4	10	15	25	2	..	..	3	..	..	2	3	5
	20	2	2	4	7	3	1	9	10	19	..	1	1	..	..	..	1	1	2
	27	1	..	8	7	6	5	15	12	27	..	..	..	..	..	..	..	..	0
December	4	2	1	4	4	3	4	9	9	18	..	..	1	1	..	..	1	1	2
	11	2	1	6	8	2	5	10	14	24	2	..	4	..	..	..	6	..	6
	18	2	3	1	4	..	4	3	11	14	..	2	..	..	..	..	..	2	2
	25	..	..	6	2	..	2	6	4	10	..	1	..	1	..	..	..	2	2
Totals	...	42	40	156	207	49	78	247	325	572	20	17	27	34	1	0	48	51	99

TABLE XIII., showing WEEKLY NOTIFICATIONS of and DEATHS from DIPHTHERIA, during 1898, in the BOROUGH of LONGTON.

1898. — Week ending.		Notified Cases.									Deaths.								
		Ages.						Total each Sex.		Total both Sexes.	Ages.						Total each Sex.		Total both Sexes.
		Under 3 years.		3 to 15 years.		Over 15 years.					Under 3 years.		3 to 15 years.		Over 15 years.				
		M.	F.	M.	F.	M.	F.	M.	F.	Both.	M.	F.	M.	F.	M.	F.	M.	F.	Both.
January	1	4	1	2	3	5	1	11	5	16	1	1	...	...	...	...	1	1	2
	8	2	2	6	6	2	4	10	12	22	2	...	...	...	1	...	3	...	3
	15	...	5	12	19	4	5	16	29	45	...	1	1	1	...	...	1	2	3
	22	1	...	4	8	2	1	7	9	16	1	2	1	1	1	...	3	3	6
	29	2	2	4	5	5	3	11	10	21	1	1	1	1	...	...	2	2	4
February	5	...	...	6	2	2	4	8	6	14	...	...	2	1	...	...	2	1	3
	12	...	1	3	4	...	4	3	9	12	...	...	2	1	...	...	2	1	3
	19	1	...	5	3	1	5	7	8	15	...	1	1	1	...	...	1	2	3
	26	...	1	5	3	...	2	5	6	11	...	...	...	1	...	...	...	1	1
March	5	2	5	1	4	1	3	4	12	16	...	...	1	...	...	...	1	...	1
	12	2	2	3	10	...	6	5	18	23	...	...	1	2	...	...	1	2	3
	19	...	...	3	...	1	4	4	4	8	...	...	1	1	...	...	1	1	2
	26	1	1	1	6	1	1	3	8	11	...	2	...	...	...	...	...	2	2
April	2	...	...	2	2	...	2	2	4	6	2	...	1	...	...	...	3	...	3
	9	...	...	...	4	...	1	...	5	5	...	...	...	1	...	...	...	1	1
	16	...	1	1	2	...	3	1	6	7	...	...	1	...	...	...	1	...	1
	23	1	...	1	3	1	2	3	5	8	1	1	...	...	...	...	1	1	2
	30	2	1	3	6	1	2	6	9	15	...	...	1	2	...	...	1	2	3
May	7	...	...	2	8	...	3	2	11	13	...	...	...	1	...	...	...	1	1
	14	...	1	3	5	2	4	5	10	15	...	1	...	...	...	...	...	1	1
	21	1	...	3	2	1	1	5	3	8	...	1	...	...	...	...	...	1	1
	28	1	...	4	3	2	2	7	5	12	1	...	...	...	...	...	1	...	1
June	4	2	...	2	2	...	...	4	2	6	1	...	1	2	...	...	2	2	4
	11	...	1	...	1	3	1	3	3	6	...	...	...	...	...	...	...	...	...
	18	1	1	1	1	...	2	2	4	6	...	1	...	...	...	...	...	1	1
	25	...	...	2	2	...	1	2	3	5	...	...	1	1	...	...	1	1	2
July	2	1	1	3	3	...	1	4	5	9	...	...	...	2	...	...	...	2	2
Totals	...	24	26	82	117	34	68	140	211	351	10	12	16	19	2	...	28	31	59

DIPHTHERIA IN LONGTON.

CHART I SHOWING NOTIFIED CASES AND DEATHS WEEK BY WEEK DURING 1896 & ALSO SHOWING PERIODS OF SCHOOL-CLOSURE.

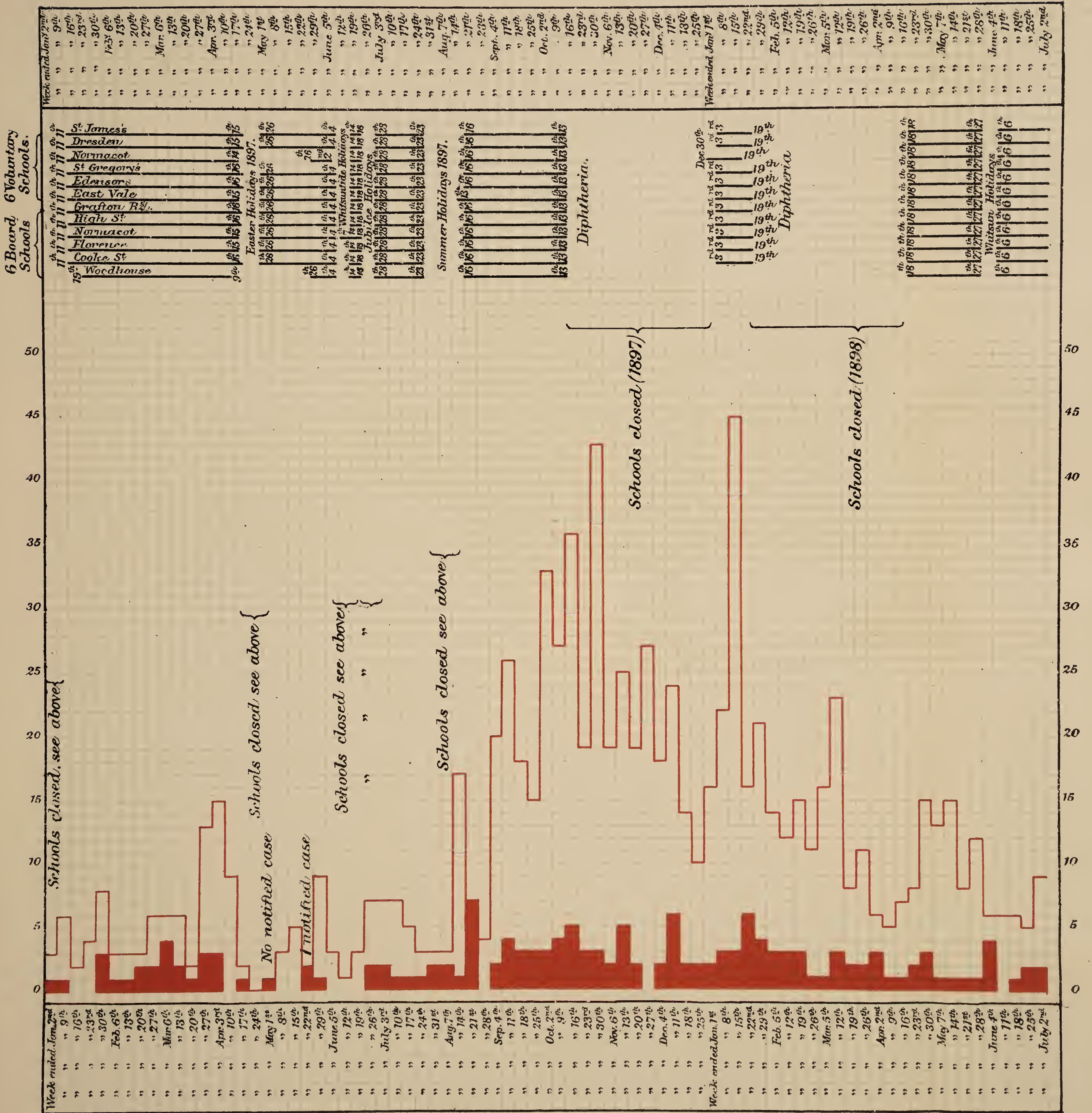


EXPLANATION.

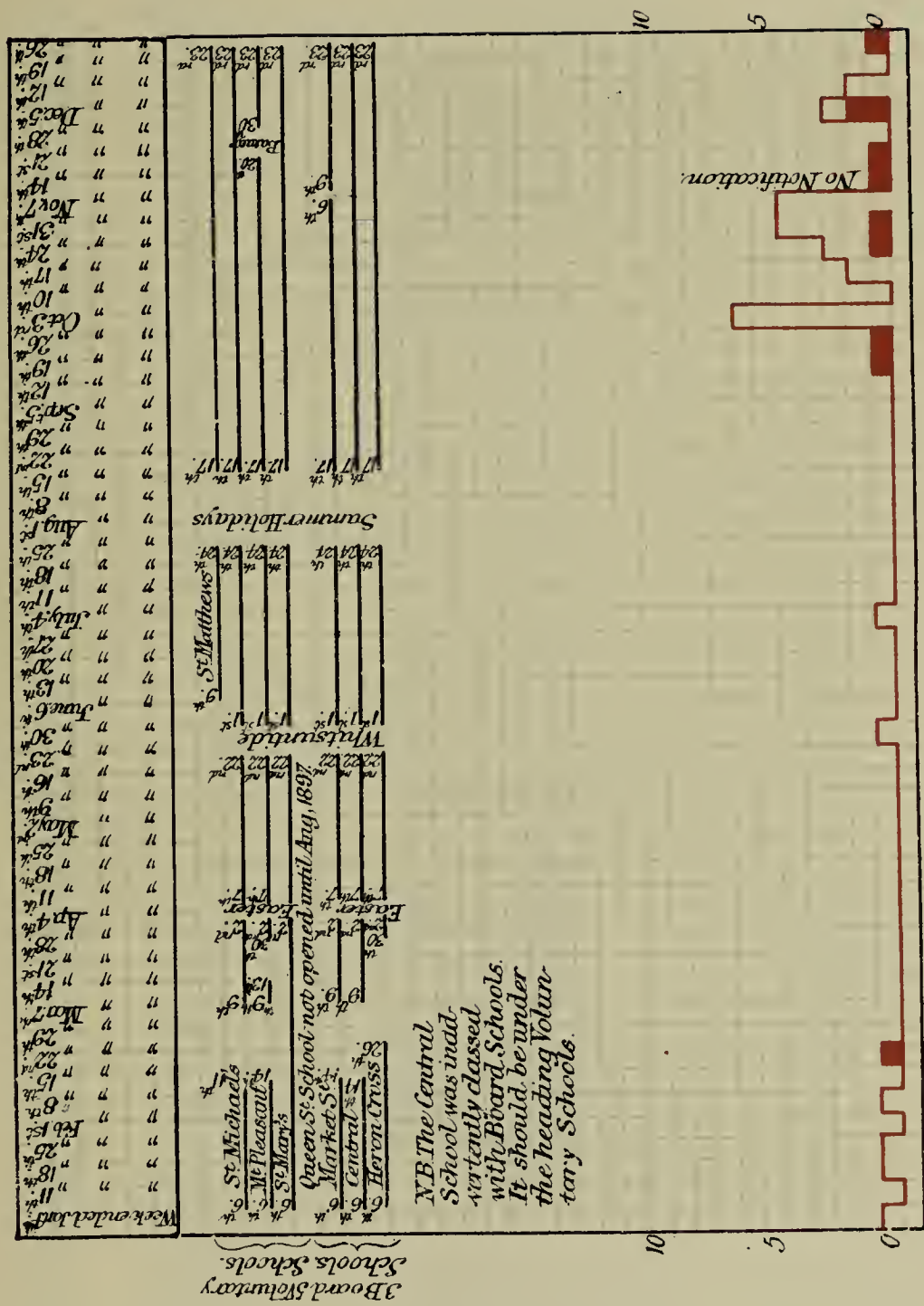
In all these Charts the Weeks are shown at the top, Weekly Deaths by squares blocked red, and Weekly Notifications by squares out-lined red. Thus, each vertical column indicates a week, the particular week being shown at the top, and what happened in it at the bottom. The interrupted black lines indicate Schools, one line for each, the name being written over it. The gaps in the black lines indicate periods of School closure approximately, the exact dates being given at the beginning and end of each black line.

DIPHThERIA AT LONGTON.

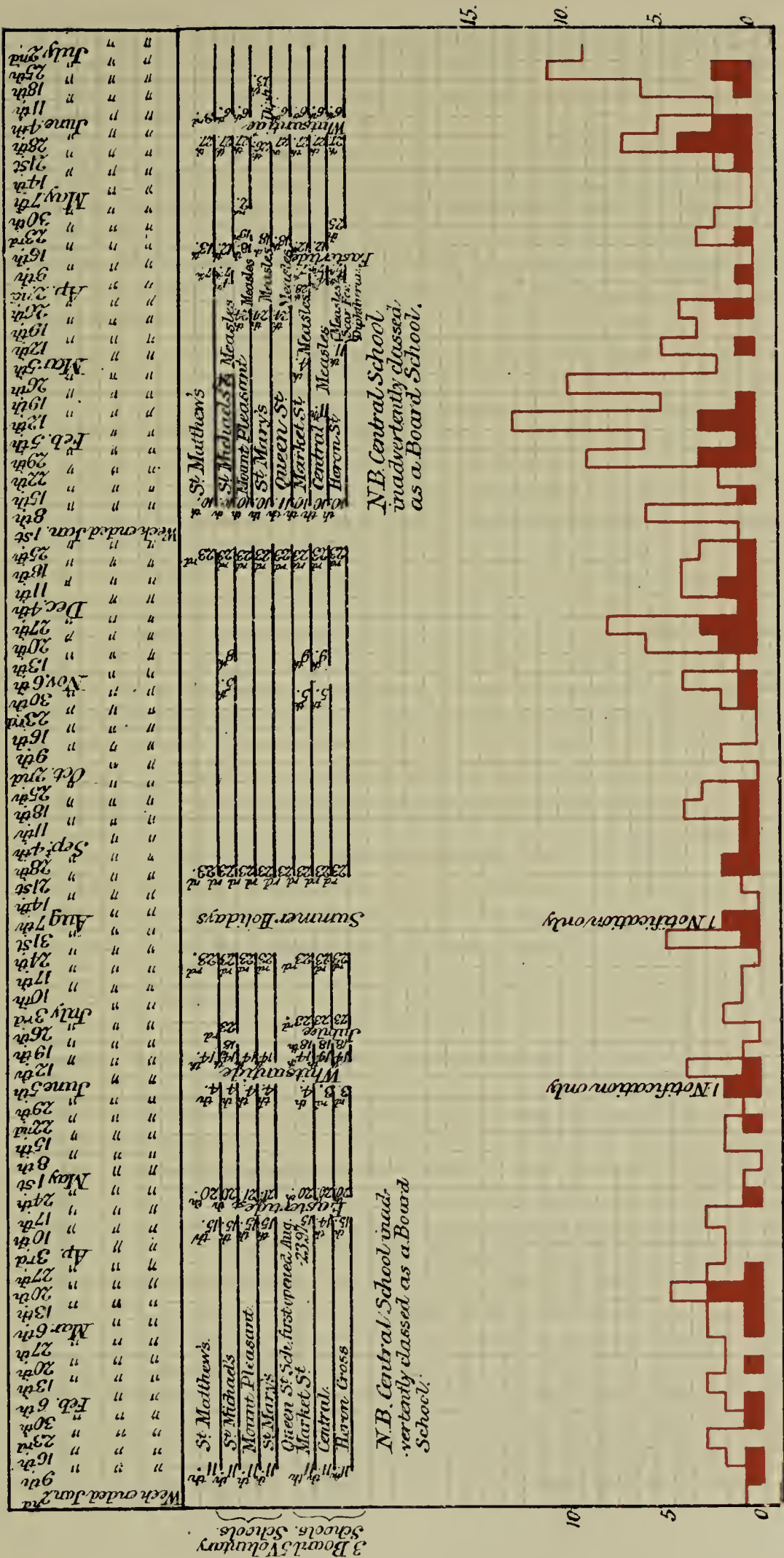
CHART II SHOWING NOTIFIED CASES AND DEATHS WEEK BY WEEK DURING 1897,
AND FIRST HALF OF 1898, AND ALSO PERIODS OF SCHOOL CLOSURE.



DIPHTHERIA IN FENTON.
 CHART III SHOWING WEEKLY NOTIFICATIONS DEATHS DURING 1896;
 AND ALSO SHOWING PERIODS OF SCHOOL CLOSURE.



DIPHTHERIA IN FENTON.
 CHART IV SHOWING WEEKLY NOTIFICATIONS AND DEATHS DURING 1897 AND FIRST HALF OF 1898 AND ALSO
 SHOWING PERIODS OF SCHOOL CLOSURE.



AGE AND SEX DISTRIBUTION IN LONGTON.

In the Census Returns for 1891 the sex constitution of Longton is given as follows :—Males = 16,608. Females = 17,719. Total = 34,327.

In the same returns the age constitution of the Stoke Registration District is given as shown below :—

Under 3 years = 10,352. Three to 15 years = 35,802. Over 15 years = 75,305. Total = 121,459.

Having these data, and the 1881 census population of Longton (as now constituted), namely, 29,915, and assuming that the age distribution in Longton corresponds approximately with that for the whole Registration District, and that the yearly increase since 1891 has been at the same rate as that from 1881 to 1891, the following figures have been calculated for Longton :—

		Under 3 yrs.	3 to 15 yrs.	Over 15 yrs.
Est. Pop. middle of 1896 = 36,899 =	{ Males = 17,852 =	1,531	+ 5,238	+ 11,083.
	{ Females = 19,047 =	1,613	+ 5,640	+ 11,794.
Est. Pop. middle of 1897 = 37,409 =	{ Males = 18,099 =	1,552	+ 5,311	+ 11,236.
	{ Females = 19,310 =	1,635	+ 5,718	+ 11,957.
Est. Pop. middle of 1898 = 37,927 =	{ Males = 18,350 =	1,574	+ 5,384	+ 11,392.
	{ Females = 19,577 =	1,658	+ 5,797	+ 12,122.

The following table has been calculated from the above figures, and those given in Tables XI., XII., and XIII.

TABLE XIV., showing ATTACK-RATES per 1,000 living at each AGE-GROUP, quarter by quarter, from January, 1896, to July 2nd, 1898, and the corresponding ANNUAL DEATH-RATES, giving such rates for each sex, and for both sexes combined :—

Age-Groups.	Sexes.	Notified Attacks per 1,000 for each Sex and for both Sexes at each Age-Group.												
		1896.				1897.				1898.		Rates for Whole Years.		
		1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	1st Quarter.	2nd Quarter.	1896.	1897.	1898.†
Under 3 yrs.	Males ...	...	...	1·96	1·96	2·58	1·93	6·44	16·11	9·53	5·72	3·92	27·06	30·50
	Females	...	...	1·24	1·86	4·89	2·45	4·28	12·84	12·06	3·62	3·10	24·46	31·36
	Both...	...	...	1·59	1·91	3·76	2·19	5·33	14·43	10·83	4·64	3·50	25·71	30·94
3 to 15 yrs.	Males...	·19	...	2·67	3·44	3·77	3·39	6·59	15·63	10·21	5·01	6·30	29·37	30·46
	Females	...	·53	·35	2·66	4·37	5·07	9·79	16·96	12·59	7·59	3·55	36·20	40·36
	Both...	·09	·27	1·47	3·03	4·08	4·26	8·25	16·32	11·44	6·35	4·87	32·91	35·60
Over 15 yrs.	Males...	·09	·36	...	·27	·18	·18	·71	3·29	2·11	0·88	·72	4·36	5·97
	Females	·08	·25	·34	·76	·50	·17	1·59	4·27	3·55	2·06	1·44	6·52	11·21
	Both...	·09	·31	·17	·52	·34	·17	1·16	3·79	2·85	1·49	1·09	5·48	8·68

† Attack-rate in two quarters dealt with as if maintained throughout the year.

TABLE XV., based on Tables XI., XII., and XIII., and on the figures on the preceding page, showing, for LONGTON, QUARTERLY ATTACKS ON MALES and FEMALES of EACH AGE-GROUP, on BOTH SEXES at EACH AGE-GROUP, and PERCENTAGES of TOTAL ATTACKS ; also YEARLY ATTACKS and YEARLY PERCENTAGES.

1896.

—		1st Quarter				2nd Quarter.				3rd Quarter.				4th Quarter.				Whole Year.			
AGE-GROUPS.	Sexes.	Attacks, each sex.		Percentage of attacks, each sex.		Attacks, both sexes.		Percentage of attacks, both sexes.		Attacks, each sex.		Percentage of attacks, each sex.		Attacks, both sexes.		Percentage of attacks, both sexes.		Attacks, each sex.		Percentage of attacks, each sex.	
		Attacks, each sex.	Percentage of attacks, each sex.	Attacks, both sexes.	Percentage of attacks, both sexes.	Attacks, each sex.	Percentage of attacks, each sex.	Attacks, both sexes.	Percentage of attacks, both sexes.	Attacks, each sex.	Percentage of attacks, each sex.	Attacks, both sexes.	Percentage of attacks, both sexes.	Attacks, each sex.	Percentage of attacks, each sex.	Attacks, both sexes.	Percentage of attacks, both sexes.	Attacks, each sex.	Percentage of attacks, each sex.	Attacks, both sexes.	Percentage of attacks, both sexes.
Under 3 years.	M.	...	...	...	...	...	...	...	...	3	12	5	20	3	5.9	6	6.7	11	12.4		
	F.	...	...	...	...	...	...	...	...	2	8	...	...	3	5.9	5	5.6	...	...		
3 to 15 years.	M.	1	33.3	1	33.3	...	...	3	30	14	56	16	64	18	35.3	33	37.1	53	59.5		
	F.	...	...	...	...	3	30	...	...	2	8	...	...	15	29.4	20	22.5	...	...		
Over 15 years.	M.	1	33.3	2	66.7	4	40	7	70	...	...	4	16	3	5.9	8	9	25	28.1		
	F.	1	33.3	...	...	3	30	...	...	4	16	...	...	9	17.6	17	19.1	...	...		
Totals.	M.	2	66.7	3	100	4	40	10	100	17	68	25	100	24	47.1	47	52.8	89	100		
	F.	1	33.3	...	...	6	60	...	...	8	32	...	...	27	52.9	42	47.2	...	...		

1897.

Under 3 years.	M.	4	6.1	12	18.5	3	5.2	7	12.1	10	7.4	17	12.6	25	8.0	46	14.7	42	7.3	82	14.3
	F.	8	12.3	...	...	4	6.9	...	...	7	5.2	...	...	21	6.7	...	...	40	7.0	...	...
3 to 15 years.	M.	20	30.8	45	69.2	18	31.0	47	81.0	35	25.9	91	67.4	83	26.4	180	57.3	156	27.3	363	63.5
	F.	25	38.5	...	...	29	50.0	...	...	56	41.5	...	...	97	30.9	...	...	207	36.2	...	...
Over 15 years.	M.	2	3.1	8	12.3	2	3.4	4	6.9	8	5.9	27	20.0	37	11.8	88	28.0	49	8.6	127	22.2
	F.	6	9.2	...	...	2	3.4	...	...	19	14.1	...	...	51	16.2	...	...	78	13.6	...	...
Totals	M.	26	40	65	100	23	39.7	58	100	53	39.3	135	100	145	46.2	314	100	247	43.2	572	100
	F.	39	60	...	...	35	60.4	...	...	82	60.7	...	...	169	53.8	...	...	325	56.8	...	...

1898.

1st Half-Year.

Under 3 years.	M.	15	6.5	35	15.2	9	7.4	15	12.4									24	6.8	50	14.2
	F.	20	8.7	...	...	6	5.0	...	...									26	7.4	...	...
3 to 15 years.	M.	55	23.9	128	55.7	27	22.3	71	58.7									82	23.4	199	56.7
	F.	73	31.7	...	...	44	36.4	...	...									117	33.3	...	...
Over 15 years.	M.	24	10.4	67	29.1	10	8.3	35	28.9									34	9.7	102	29.1
	F.	43	18.7	...	...	25	20.7	...	...									68	19.4	...	...
Totals	M.	94	40.9	230	100	46	38.0	121	100									140	39.9	351	100
	F.	136	59.1	...	...	75	62.0	...	...									211	60.1	...	...

TABLE XVI., showing WEEKLY NOTIFICATIONS of and DEATHS from DIPHTHERIA in FENTON during 1896.

Year 1896. Week ending.		Notified Cases.									Deaths.									
		Ages.						Totals for each Sex.		Totals for both Sexes.	Ages.						Totals for each Sex.		Totals for both Sexes.	
		Under 3 years.		3 to 15 years.		Over 15 years.		M.	F.	Both.	Under 3 years.		3 to 15 years.		Over 15 years.		M.	F.	Both.	
M.	F.	M.	F.	M.	F.	M.	F.				M.	F.	M.	F.	M.	F.				
January	4	1	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	
	11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	18	...	...	...	1	...	...	...	1	1	...	...	...	...	...	...	...	...	...	
	25	...	...	...	1	...	...	...	1	1	...	...	...	...	...	...	...	...	...	
February	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	8	..	...	1	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	
	15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	22	...	...	...	1	...	...	...	1	1	...	...	...	1	...	...	...	1	1	
	29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
March	7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
April	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	11	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
May	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	30	...	...	...	1	...	...	...	1	1	...	...	...	...	...	...	...	...	...	
June	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
July	4	...	...	...	...	...	1	...	1	1	...	...	...	...	...	...	...	...	...	
	11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
August	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
September	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	19	...	1	...	...	...	...	...	1	1	...	...	...	1	...	...	...	1	1	
	26	...	...	1	...	...	...	1	...	1	...	...	...	1	...	...	...	1	1	
October	3	...	1	1	4	...	1	1	6	7	...	...	...	...	...	...	...	...	...	
	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	17	...	...	1	1	...	...	1	1	2	...	...	...	...	...	...	...	...	...	
	24	...	...	2	1	...	...	2	1	3	...	...	1	...	...	...	1	...	1	
	31	1	...	3	1	...	...	4	1	5	...	1	...	...	...	...	...	1	1	
November	7	...	...	3	1	...	1	3	2	5	...	...	...	...	...	...	...	...	...	
	14	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	1	
	21	...	...	1	...	...	...	1	...	1	...	...	1	...	...	...	1	...	1	
	28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
December	5	1	...	2	...	...	...	3	...	3	1	...	1	...	...	...	2	...	2	
	12	1	...	1	...	...	...	2	...	2	...	...	...	...	...	...	...	...	...	
	19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	26	...	...	1	...	...	...	1	...	1	...	...	1	...	...	...	1	...	1	
Totals		...	4	2	17	12	...	3	21	17	38	2	1	4	3	...	...	6	4	10

TABLE XVII., showing WEEKLY NOTIFICATIONS of and DEATHS from
DIPHTHERIA in FENTON during 1897.

Year 1897. Week ending		Notified Cases.									Deaths.								
		Ages.						Totals for each Sex.		Totals for both Sexes.	Ages.						Totals for each Sex.		Totals for both Sexes.
		Under 3 years.		3 to 15 years.		Over 15 years.					Under 3 years.		3 to 15 years.		Over 15 years.				
		M.	F.	M.	F.	M.	F.	M.	F.	Both.	M.	F.	M.	F.	M.	F.	M.	F.	Both.
January	2	...	1	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	
	9	1	...	...	...	...	...	1	..	1	...	1	...	...	...	...	1	1	
	16	...	...	...	2	...	...	...	2	2	1	...	...	...	...	...	1	1	
	23	1	...	...	2	...	...	1	2	3	...	...	...	...	...	...	...	...	
	30	...	1	...	...	...	..	...	1	1	1	...	...	...	...	...	1	1	
February	6	1	...	...	1	...	...	1	1	2	1	...	...	...	...	...	1	1	
	13	2	...	1	...	...	...	3	...	3	...	...	...	...	...	...	...	...	
	20	1	1	...	...	...	...	1	1	2	1	...	...	...	...	...	1	1	
	27	...	1	...	1	...	...	...	2	2	...	...	...	...	...	...	...	...	
March	6	1	1	...	1	...	...	1	2	3	...	1	...	...	...	...	1	1	
	13	...	...	1	1	...	1	1	2	3	...	...	1	...	...	...	1	1	
	20	...	3	1	1	...	...	1	4	5	...	...	1	2	...	...	1	3	
	27	...	1	1	1	...	...	1	2	3	...	...	...	1	...	...	1	1	
April	3	...	...	...	1	...	1	...	2	2	...	...	...	...	...	...	...	...	
	10	2	...	...	...	...	...	2	...	2	...	...	...	...	...	...	...	...	
	17	...	1	1	1	...	...	1	2	3	...	...	...	...	...	...	...	...	
	24	...	...	...	1	...	...	...	1	1	...	1	...	...	..	...	1	1	
May	1	...	1	...	...	...	...	..	1	1	...	...	...	...	...	...	...	...	
	8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	15	...	...	1	...	...	1	1	1	2	...	...	...	...	...	...	...	...	
	22	...	...	...	1	1	...	1	1	2	...	...	...	1	...	...	1	1	
	29	...	...	...	1	...	...	...	1	1	...	...	...	...	...	...	...	...	
June	5	...	...	...	1	...	...	...	1	1	...	...	...	2	...	...	...	2	
	12	...	...	1	3	...	...	1	3	4	...	1	...	...	...	...	1	1	
	19	...	...	...	1	...	...	...	1	1	...	...	...	...	...	...	...	...	
	26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
July	3	...	...	2	...	...	...	2	...	2	...	...	...	...	...	...	...	...	
	10	...	...	...	1	...	...	...	1	1	...	...	...	...	...	...	...	...	
	17	...	...	...	...	...	1	...	1	1	...	...	...	...	...	...	...	...	
	24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	31	1	...	1	3	...	...	2	3	5	...	...	...	1	...	...	...	1	
August	7	...	...	1	...	...	...	1	...	1	...	1	1	...	...	...	1	2	
	14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	21	...	...	...	...	1	...	1	...	1	...	...	...	...	...	...	...	...	
	28	...	...	1	1	...	...	1	1	2	1	...	1	...	...	..	2	2	
September	4	1	...	...	...	...	...	1	...	1	...	...	1	...	...	...	1	1	
	11	...	...	...	1	...	...	...	1	1	...	...	...	1	...	...	...	1	
	18	...	...	1	1	1	1	2	2	4	...	...	...	1	...	...	...	1	
	25	...	...	3	...	...	...	3	...	3	...	...	...	1	...	...	...	1	
October	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	9	1	...	1	...	...	...	2	...	2	...	...	...	...	...	...	...	...	
	16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
	30	...	...	1	...	1	...	2	...	2	...	...	1	...	...	...	1	1	
November	6	...	1	3	...	...	...	3	1	4	..	1	...	...	...	...	1	1	
	13	...	...	...	1	...	...	...	1	1	...	...	...	...	...	...	...	...	
	20	1	2	1	1	...	1	2	4	6	2	...	...	...	...	...	2	2	
	27	1	2	2	2	1	...	4	4	8	...	2	1	...	...	...	1	3	
December	4	...	...	...	1	...	...	...	1	1	...	...	1	...	...	...	1	1	
	11	...	1	1	1	...	1	1	3	4	...	...	1	...	...	1	1	2	
	18	...	...	1	1	1	1	2	2	4	...	1	...	...	...	...	1	1	
	25	1	...	1	1	...	...	2	1	3	1	...	...	...	...	...	1	1	
Totals	...	15	17	27	35	6	8	48	60	108	8	9	9	10	...	1	17	37	

TABLE XVIII., showing WEEKLY NOTIFICATIONS of and DEATHS from DIPHTHERIA in FENTON during 1896 up to the Week ending June 25th.

First Half Year 1898. — Week ending		Notified Cases.									Deaths.								
		Ages.						Totals for each Sex.		Totals for both Sexes.	Ages.						Totals for each Sex.		Totals for both Sexes.
		Under 3 years.		3 to 15 years.		Over 15 years.					Under 3 years.		3 to 15 years.		Over 15 years.				
		M.	F.	M.	F.	M.	F.	M.	F.	Both.	M.	F.	M.	F.	M.	F.	M.	F.	Both.
January	1	...	...	...	...	..	1	...	1	1	...	...	...	...	...	...	...	...	...
	8	...	...	...	3	2	1	2	4	6	...	...	...	...	...	...	...	...	...
	15	...	...	...	1	...	...	...	1	1	...	1	...	...	...	...	1	...	1
	22	...	...	2	...	...	...	2	...	2	...	...	...	...	...	...	...	...	...
	29	...	...	2	6	...	1	2	7	9	1	...	...	2	...	..	1	2	3
February	5	..	...	1	5	...	...	1	5	6	...	1	...	...	..	...	...	1	1
	12	1	...	1	7	2	2	4	9	13	1	...	...	2	...	...	1	2	3
	19	...	...	2	3	...	...	2	3	5	...	...	...	1	...	...	...	1	1
	26	1	...	4	4	...	1	5	5	10	...	...	...	...	...	...	...	...	...
March	5	...	...	1	1	...	...	1	1	2	...	...	...	...	...	...	...	...	...
	12	...	...	1	2	...	2	1	4	5	...	1	...	...	...	...	...	1	1
	19	...	...	2	1	...	...	2	1	3	...	...	...	...	...	...	...	..	...
	26	...	...	...	4	...	...	...	4	4	...	1	...	1	...	...	...	2	2
April	2	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	9	1	...	...	...	...	...	1	...	1	1	...	...	...	...	...	1	...	1
	16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	23	...	1	1	1	...	...	1	2	3	...	...	...	1	...	...	...	1	1
	30	...	...	1	1	...	...	1	1	2	...	...	...	...	...	...	...	...	...
May	7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	21	...	...	...	2	...	...	...	2	2	...	...	...	1	...	...	...	1	1
	28	...	...	1	6	...	...	1	6	7	...	...	2	2	...	...	2	2	4
June	4	...	...	4	1	...	...	4	1	5	1	...	...	1	...	...	1	1	2
	11	1	1	...	...	...	...	1	1	2	...	...	...	...	...	...	...	...	...
	18	...	3	...	3	...	...	...	6	6	...	1	...	...	...	...	...	1	1
	25	2	2	3	2	1	1	6	5	11	...	...	...	2	...	...	...	2	2
July	2	...	1	4	4	...	...	4	5	9	...	...	...	...	...	...	...	...	...
Totals	...	6	8	30	57	5	9	41	74	115	4	5	2	13	...	...	6	18	24

AGE AND SEX DISTRIBUTION IN FENTON.

Census population of Fenton, 1881 = 13,830.

" " " " 1891 = 16,998 = { Males, 8,424.
 { Females, 8,574.

For age-constitution of the Stoke Registration District, *see* Appendix, p. 25, near top. Assuming the age-constitution to correspond in Fenton, the following figures may be obtained :—

			Under 3 yrs.	3 to 15 yrs.	Over 15 yrs.
Estimated population }					
middle of 1896 ... }	= 18,941 =	{ Males, 9,387 = 800 + 2,767 + 5,820			
		{ Females, 9,554 = 814 + 2,816 + 5,924			
Estimated population }					
middle of 1897 ... }	= 19,336 =	{ Males, 9,583 = 817 + 2,824 + 5,942			
		{ Females, 9,753 = 831 + 2,875 + 6,047			
Estimated population }					
middle of 1898 ... }	= 19,739 =	{ Males, 9,782 = 834 + 2,883 + 6,065			
		{ Females, 9,957 = 848 + 2,935 + 6,174			

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1898.